MANAGING YOUR MONEY ON THE MAC: PAGE 152

MACWORLD

The Macintosh® Magazine

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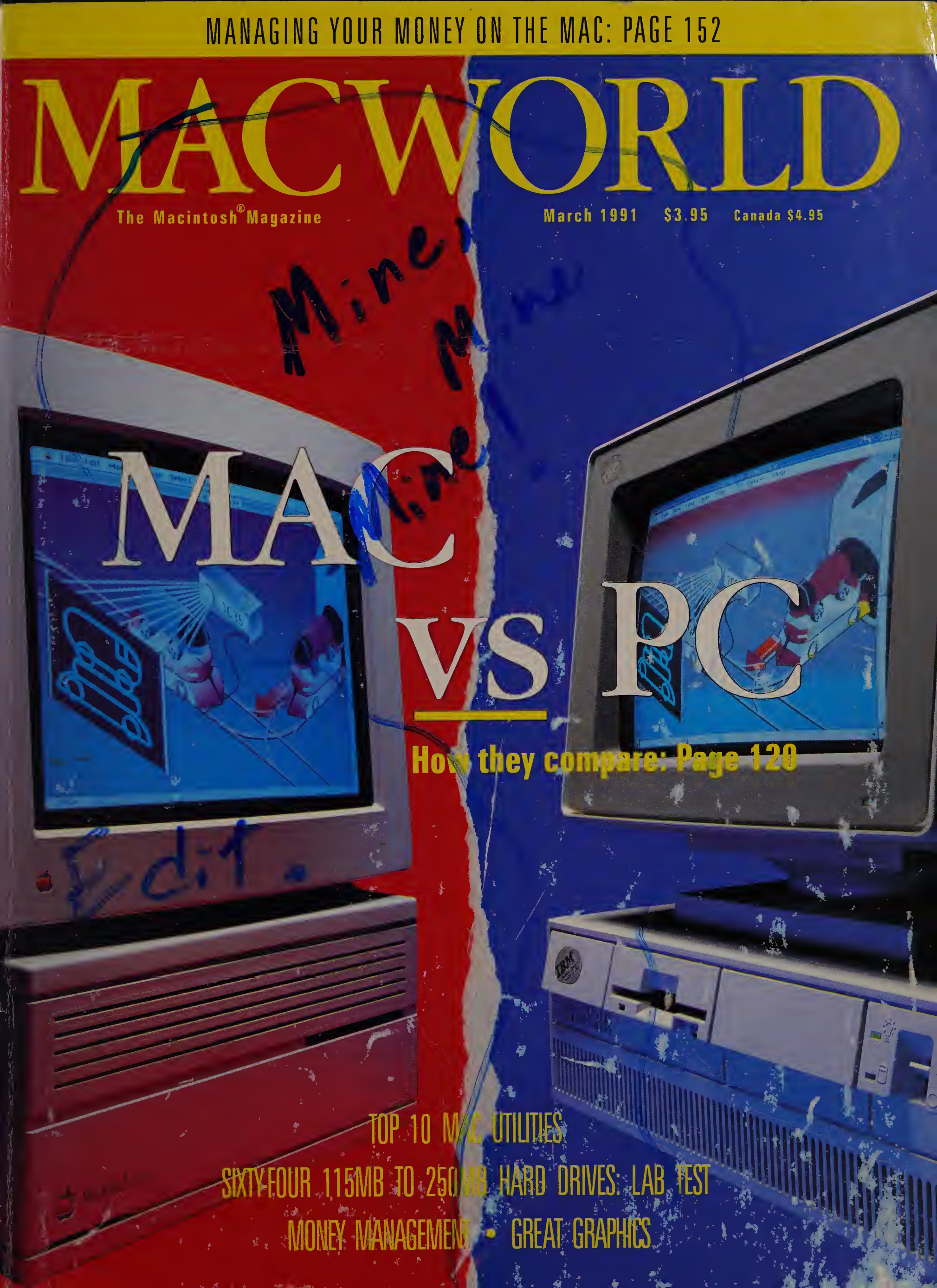


MAC VS PC

How they compare: Page 120

TOP 10 MAC UTILITIES

SIXTY-FOUR 115MB TO 250MB HARD DRIVES: LAB TEST

MONEY MANAGEMENT • GREAT GRAPHICS

Now the person making the presentation can make the presentation.

The old adage, "If you want something done right, do it yourself" couldn't be more true than when you're making a presentation. Or, right now, more possible.

PowerPoint, the best-selling desktop presentation program for the Macintosh, takes the stress out of putting together presentations—even when you have last-minute changes.

In fact, all you will really need is Microsoft® PowerPoint® software and an Apple® Macintosh® to run it.

It's the easiest, most cost-efficient way to assemble a professional-looking presentation from conception to completion, and right from your own desktop.

PowerPoint gives you the power to create your own picture-perfect overhead transparencies, flipcharts, 35mm color slides, speaker notes, and audience handouts. In such record-breaking time that there'll be nothing for you to do the night before the big day but sleep.

Its built-in word processor (complete with spelling checker) and drawing tools allow you to mix text and graphics in countless ways. You can use different typefaces, logos, special effects like shaded backgrounds, dropshadows, diagrams and color-coordinated palettes. Or you can copy charts, tables, and illustrations from other programs, like Microsoft Excel, with a simple cut and paste.

Once you design an overall "look" for your presentation, PowerPoint allows you to standardize that format automatically. So you can use it slide after slide.

And you can make global changes easily with the Slide Master, which instantly executes your revisions throughout.

At any point along the way, the Slide Sorter feature lets you view slides one by one or scan your entire presentation at a glance, or simply rearrange the order with a point and click.

Then, whenever you're ready, you can print out all your presentation materials – from attention-getting overheads to handy speaker notes – without ever leaving your desk.

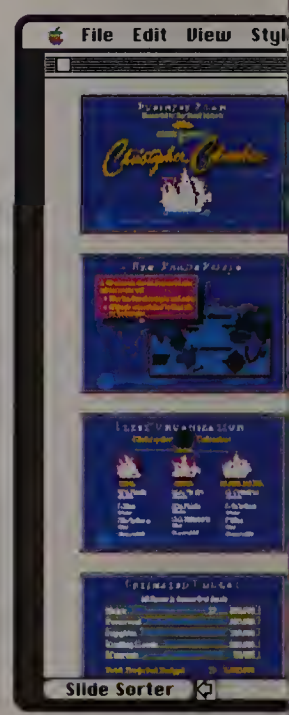
If 35mm slides are in order, simply send your presentation to the nearest Genigraphics® center, the leading presentation graphics service bureau, and your slides will be on their way in 24 hours.

Lastly, last-minute changes need no longer cause traditional last-minute panic. Because a PowerPoint presentation is as easy to change as it is to create.

If you'd like a live PowerPoint demonstration, call (800) 541-1261, Dept. P54 for the location of your nearest Microsoft dealer.

And remember, the best part of doing a presentation all by yourself comes afterward.

When you get all the credit.



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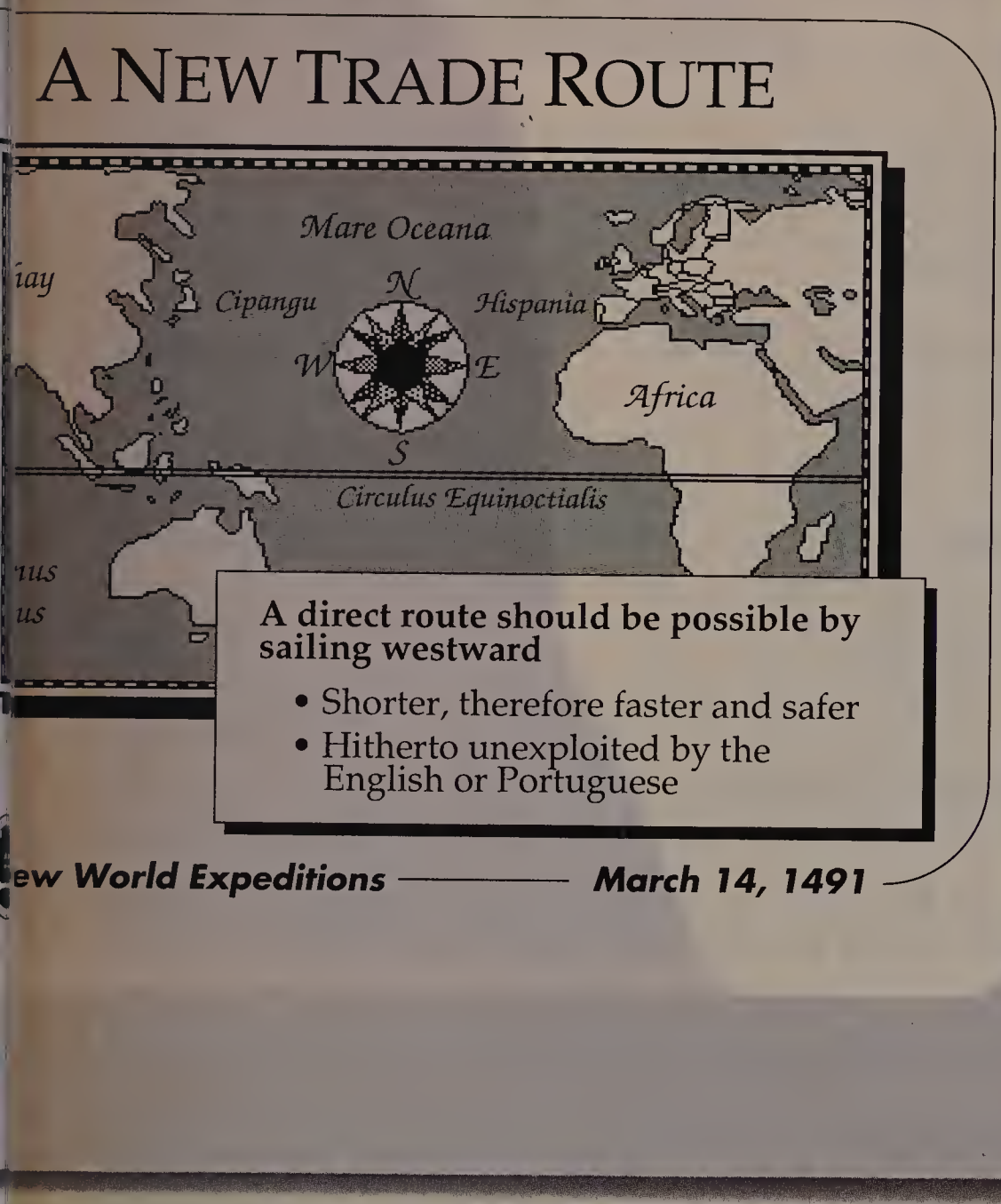
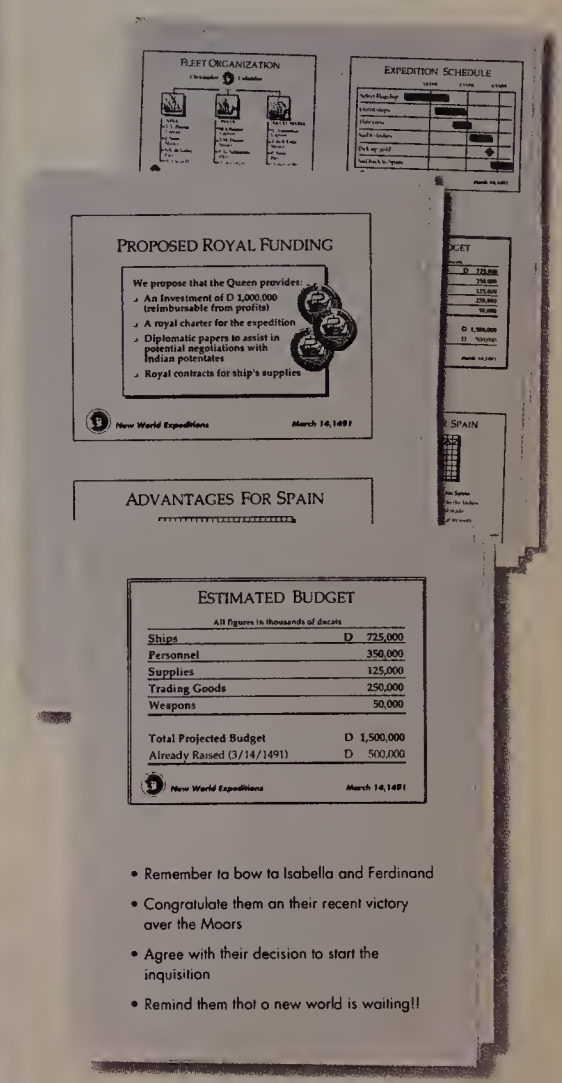
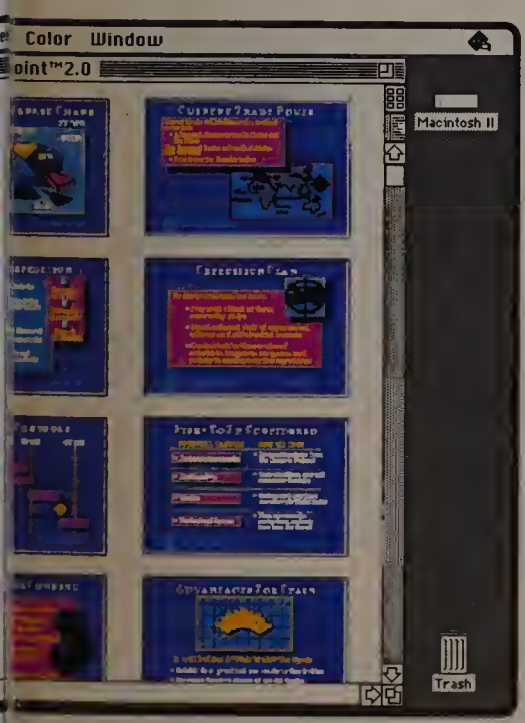


With artfully designed PowerPoint overheads, your presentation will be the center of attention.

The Slide Show feature turns your Macintosh into a projector—for quick rehearsals or slick on-screen presentations.

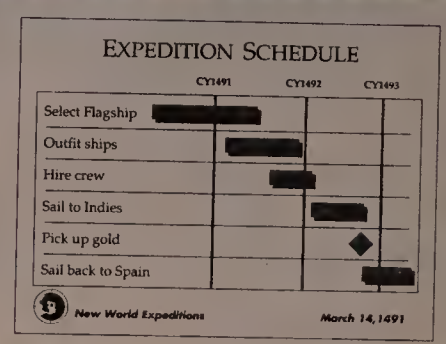


With PowerPoint it's easy to print out your speaker notes, or handouts with up to two, three, or six slides of your presentation on a page.



The PowerPoint Slide Sorter lets you put your presentation in order with a simple point and click.

You'll create 35mm slides in your choice of 16.8 million decorator colors with a Mac® II.



Your audience will flip over charts like this, created entirely with PowerPoint.

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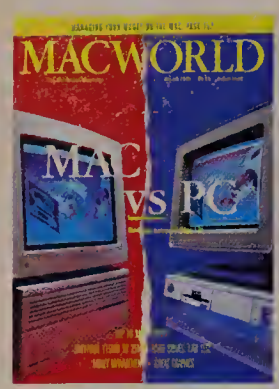

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Intuitive Mac versus inscrutable PC—as the battle continues, we tackle the big question: Which is the better tool for the real world? See page 120. (Photo by David Bishop.)

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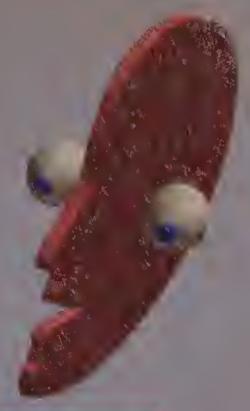

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By Cheryl England Spencer Macworld Lab rates the 115MB to 250MB contenders on price, performance, and features to find the standouts in an ever-growing crowd.

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By Joe Matazzoni Each year Macintosh artists seem to get better and better. We've showcased the winners of our third annual *Macworld* Mac Masters Art Contest so you can judge for yourself.

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Great Graphics
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Steve Rennie, President of REN Management Corporation

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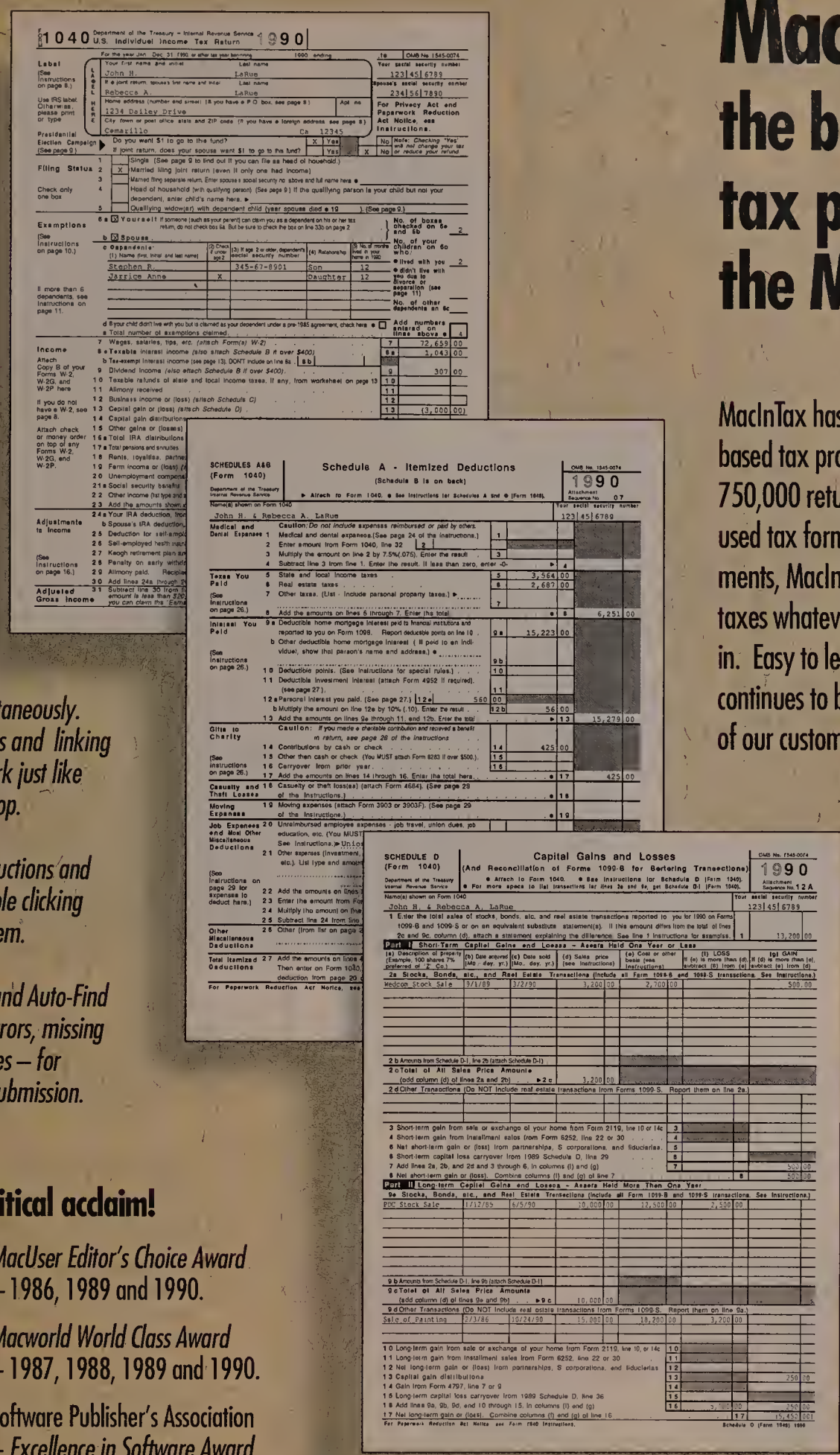

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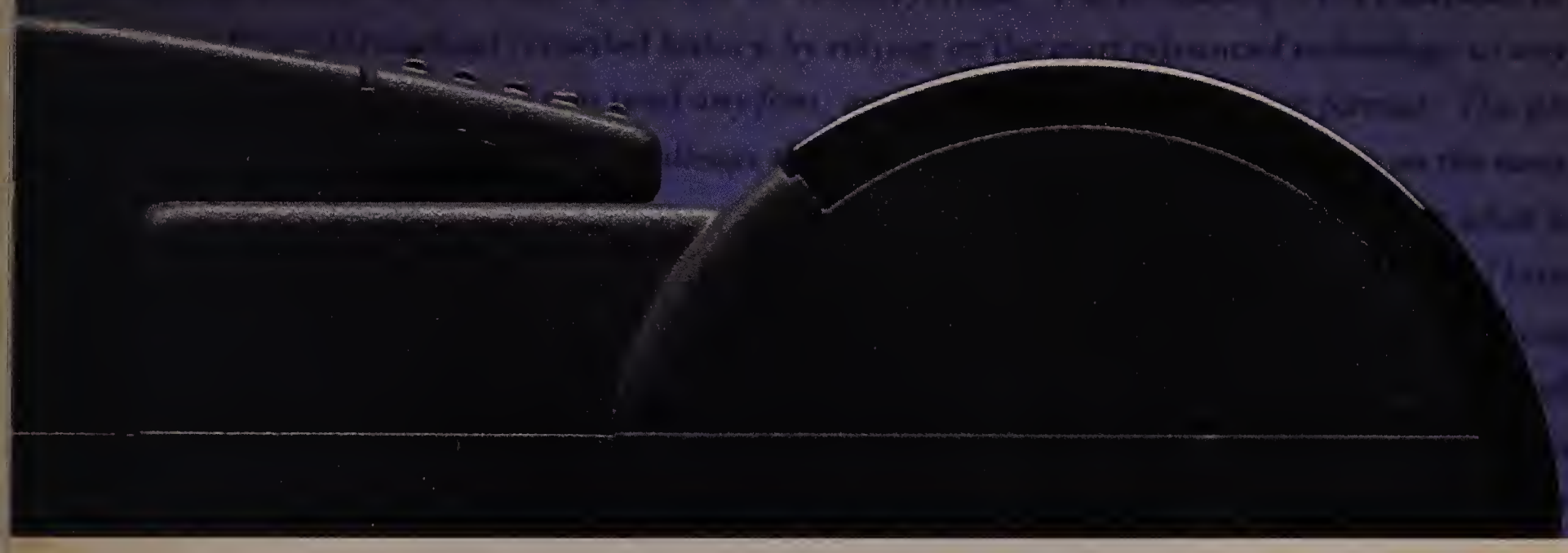

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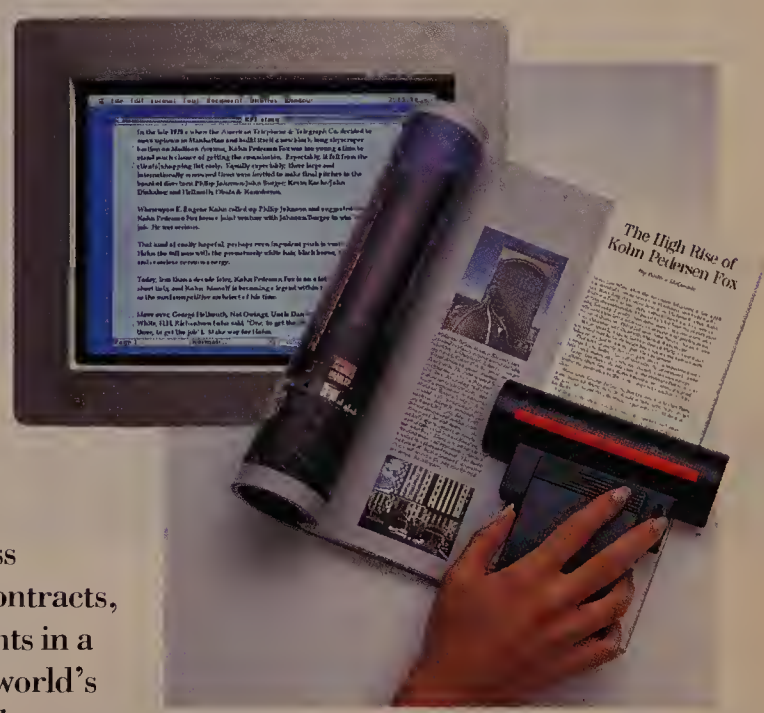

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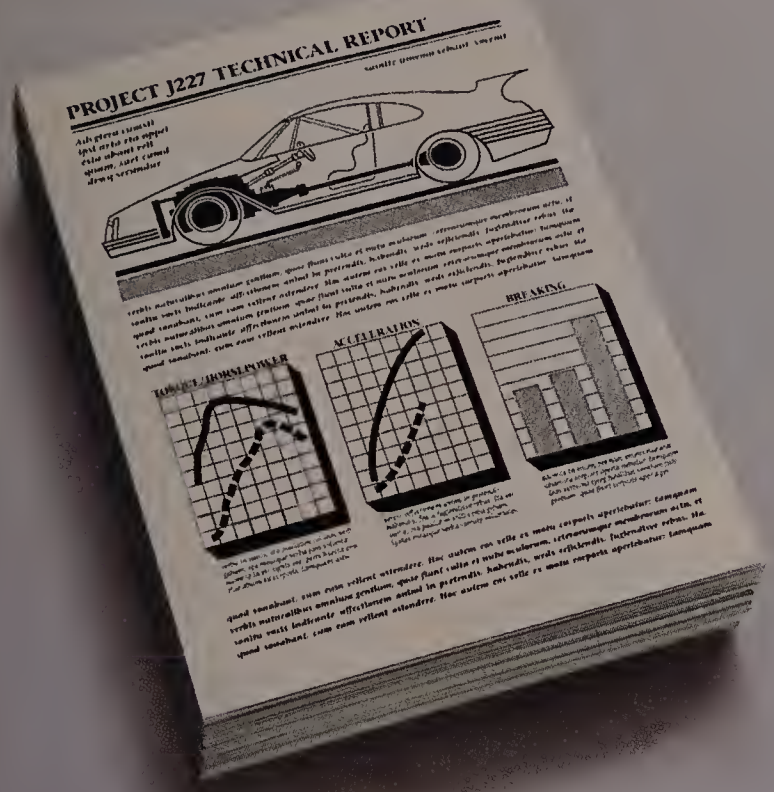

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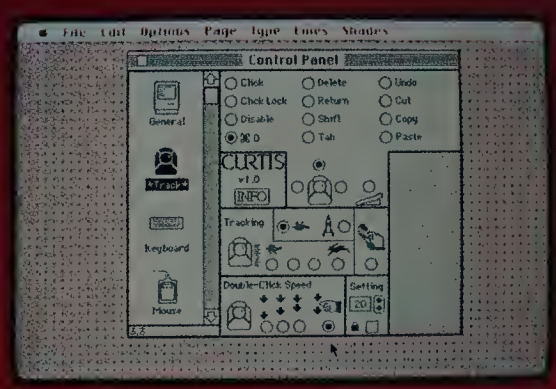

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MacBulletin

Ashton-Tate Loses dBase?

Federal courts have dismissed Ashton-Tate's long-standing suit against Fox Software. A-T accused Fox of infringing on A-T's copyright with FoxBase, which duplicates the dBase programming language. The presiding judge wrote that the dBase language derives from a public domain language developed at the Jet Propulsion Laboratory; that Ashton-Tate's copyrights are invalid; and that Ashton-Tate's "repeated failure to disclose . . . material information (to the U.S. Copyright Office) was done knowingly and with an intent to deceive." A-T said it intends to appeal to demand a jury trial.

iDS and Jasmine Offer 2½-inch Hard Drive

If you've always wanted to clip 20MB onto your belt, a 2½-inch portable hard drive from iDS and Jasmine Technologies may be just the thing. The drive is code-named the Plug-In because it connects directly to the Mac's SCSI port without a cable. The drive draws its small power requirement from the Mac through the SCSI connector. About the size of a portable cassette player, the Plug-In uses a 2½-inch drive mechanism from Conner Peripherals, and it really does come with a belt clip. iDS and Jasmine, divisions of Chess, expect to ship the new drive in late February or early March. By the third quarter the companies hope to offer 40MB and 80MB versions. The price had not been set at press time. For more information, call Jasmine at 408/752-2900.

Aapps Seized by Creditor

With assets seized by its sole secured creditor, Aapps Corporation, developers of DigiVideo, has all but closed its doors. Aapps caused a stir of excitement a year and a half ago when it debuted MicroTV, an add-in board that displays a television picture in a Mac II window. Since then other vendors—including RasterOps, E-Machines, and Radius—have introduced products with similar capabilities. Aapps is still providing product support, and according to Aapps, there is some interest in buying the technology and continuing the products. However, the future of the company is in limbo as the creditor decides what to do. For more information, contact Aapps at 408/735-8550.

Multimedia: A Standard Is Born?

Over a series of Chinese dinners in San Francisco, executives from multimedia businesses have hammered out a rough standard for controlling multimedia devices like VCRs and laser disc players. Spearheaded by MacroMind president Marc Canter, the informal Chinatown Group wants Sony, JVC, and other big hardware companies to adopt the standard, dubbed MacroMedia. Canter's office refused to give details.

Adobe Licenses Storm Technology's Compression Software

Storm Technology announced that Adobe has licensed Storm's PicturePress JPEG-compatible image-compression software. Adobe is expected to modify the compression technology from PicturePress and incorporate it into PostScript Level II, adding to JPEG's status as a growing de facto standard.

Quark: Something for Free

Quark has released the Freebies package of XTensions for QuarkXPress 3.0. The two XTensions, which are free, add 9 new features and 15 user-definable defaults. FeaturesPlus adds capabilities including creation of fractions and prices, removal of manual kerning in a selection, and a keyboard command to kern only the word spaces in selected text, as well as a much-needed grabber hand. NetworkConnection lets QuarkXPress users pass graphics and formatted text over a network from one QuarkXPress layout into another (it can also send messages). Quark has also released version 2.0 of Zapper, the QuarkXPress bug-fix utility. For more information, call Quark at 303/934-2211.

Cork Computer Claims IIci Clone

Start-up Cork Computer says it expects to ship on March 25 a $2999 clone of the Mac IIci that requires only a 128K ROM from a monochrome Macintosh. The Macintosh ROM plugs into the main logic board of the Cork System 30 and works with color ROM chips developed by Cork that the company says provide the functions of 32-bit QuickDraw without infringing on Apple's copyright. The $2999 price includes the system box with a 25MHz 68030 microprocessor, a 68882 math coprocessor, 3 NuBus slots, 4MB of RAM, a floppy disk drive, a SCSI port, and built-in 8-bit color support for an optional monitor. The Cork System 30 also has a DSP chip and software that provide the functions of a 9600-bps modem, voice mail, and sound manipulation. For more information, contact Cork Computer at 512/343-1305.

(continues)

Object Logo Lives

Apple acquired Coral Software in 1989, quickly republishing Coral's Allegro Common Lisp and leaving the object-oriented programming system Object Logo to languish. Paradigm Software is taking over Object Logo and adding new documentation, support for the new Macs, 32-bit color, and hierarchical menus. Object Logo version 2.5 will list for $149. For more information, contact Paradigm at 617/542-4245.

Big Storage

Single-user document archiving and storage is here. For $495, Blueridge Technologies' single-user Optix Desktop Imaging System provides the same features as Blueridge's $100,000-plus multiuser turnkey systems. Optix can scan batches of documents as large as E-size and save them in TIFF; later, you can index them using pop-up menus, radio buttons, and other standard Mac tools in a data entry window that you design. Optix has image-manipulation tools for rotating or unskewing documents and for comparing images, and security features to prevent alteration of scanned images. For more information, contact Blueridge Technologies at 703/675-3015.

Data Delivery

Three utilities take file-sharing between applications beyond the realm of text files and PICT images. DBMS/Copy Mac can translate files in either direction between Microsoft Excel; Microsoft Works; FoxBase+/Mac; Oracle; seven statistical packages; and Macintosh-, DOS-, and UNIX-format text files. Type of variable, numeric accuracy, and null values are retained where appropriate. DBMS/Copy Mac lists for $95. DBMS/Copy Mac With PC Access Lite lists for $185 and adds bidirectional translation for Mac applications and 26 DOS spreadsheets and databases. DBMS/Copy Mac With PC Access lists for $290 and adds support for DOS statistics, time series, graphics, and other applications. For more information, call Conceptual Software at 713/667-4222.

Tax to the Future

The millennium may be close at hand, but paying taxes is still a certainty. SoftView's 1990 version of MacInTax "interviews" you to make sure you fill out the correct forms, and there are now 14 state supplements available. MacInTax lists for $99; 1989 users can renew for $50. For more information, call SoftView at 805/385-5000.

Radius Adapts the Pivot for Built-In Video

Radius has introduced a version of its Pivot tilting monitor that can work with the Macintosh IIsi and IIci. Since both systems use Apple's on-board 8-bit video chip, the Radius Pivot For Built-In Video does not require a display adapter board. The new Pivot has a suggested list price of $1295, which is $395 less than the existing Pivot including display adapter. Radius says that it changed the timing in the display and wrote a driver called Soft Pivot, which incorporates a pixel-rotation engine. Soft Pivot intercepts QuickDraw calls and rotates the bitmap 90 degrees before it goes to the Pivot's screen. For more information, contact Radius at 408/434-1010.

Farallon Takes Over PC AppleTalk

Farallon Computing and Apple Computer have signed a long-term licensing agreement that enables Farallon to develop and market current AppleTalk products for IBM PCs and compatibles. Included in the license are the LocalTalk PC Card, Apple's add-in LocalTalk board for PCs, and Apple's AppleShare client software for MS-DOS, AppleShare PC. Those products will be renamed, sold, and supported by Farallon. Farallon plans to use the licensed technology to develop AppleTalk products for MS-DOS and Windows 3.0. For more information, contact Farallon at 415/596-9100.

Strata Paints the Town

Strata is branching out from 3-D modeling for the Mac. StrataVision Paint is capable of 64-bit color, though the Mac does not support 64-bit color and Apple has not announced 64-bit-color plans. StrataVision Paint has a few 3-D primitives (objects are not compatible with StrataVision 3d); ink- and watercolor-like tools; and a Light Table for backlighting and tracing or painting on translucent overlays. The program can create shaders such as bump maps for use in StrataVision 3d, and it supports masking, several levels of antialiasing, and separations. The program lists for $695. For more information, contact Strata at 801/628-5218.

First Impressions

With 24-bit color becoming standard (and 64-bit color a-threatening), file sizes are getting downright preposterous. Impressit is a software-only utility that compresses color images by as much as 95 percent. Radius claims that its JPEG-compatible Impressit can compress a 24-bit 640-by-480-pixel file in six seconds on a Mac IIcx. Users can select from 25 quality levels, see the results in a preview window, and incorporate a decompression engine into a file (somewhat like AutoUnstuffIt). Impressit should list for less than $200. For more information, contact Radius at 408/434-1010.

Minding Your Ps

Neon Software is developing network-analysis software for LocalTalk networks. Network managers can tell NetMinder LocalTalk to filter and record packets based on source and destination address, packet protocol, and such triggers as network events. NetMinder LocalTalk also provides tools to search and analyze captured packets. It lists for $395. Neon also publishes NetMinder Ethernet for $495. For more information, contact Neon Software at 415/283-9771. ■

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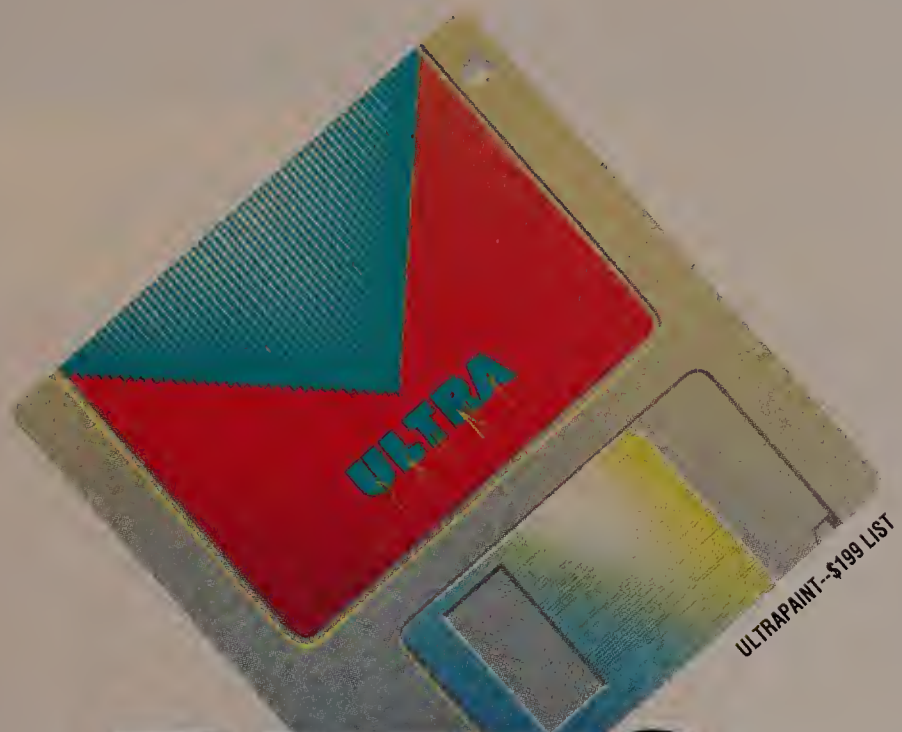

DITTO.

Even before the Macintosh Classic® & its new companions came along to wow the reviewers with heroic price/performance ratios, UltraPaint was keeping them plenty busy.

"As advertised, Deneba's UltraPaint...really does set new Macintosh graphics standards", wrote Ernest Mau of CompuServe.

"...many more B&W paint features than SuperPaint, almost all of PixelPaint's color tools, a superset of MacDraw II's object-oriented features, and the gray-scale prowess of Digital Darkroom. All this comes in a single program for less than half the price...", wrote David Pogue in MacWorld.

Perhaps Chris Prior of MacUser UK summed it up best when he wrote that "UltraPaint...could prove to be the ideal software package for those looking for a powerful, all-around draw and paint program."

And it's true. UltraPaint really does offer you the same sophisticated graphics processing power of several leading programs combined — all in one inexpensive, easy-to-use package.

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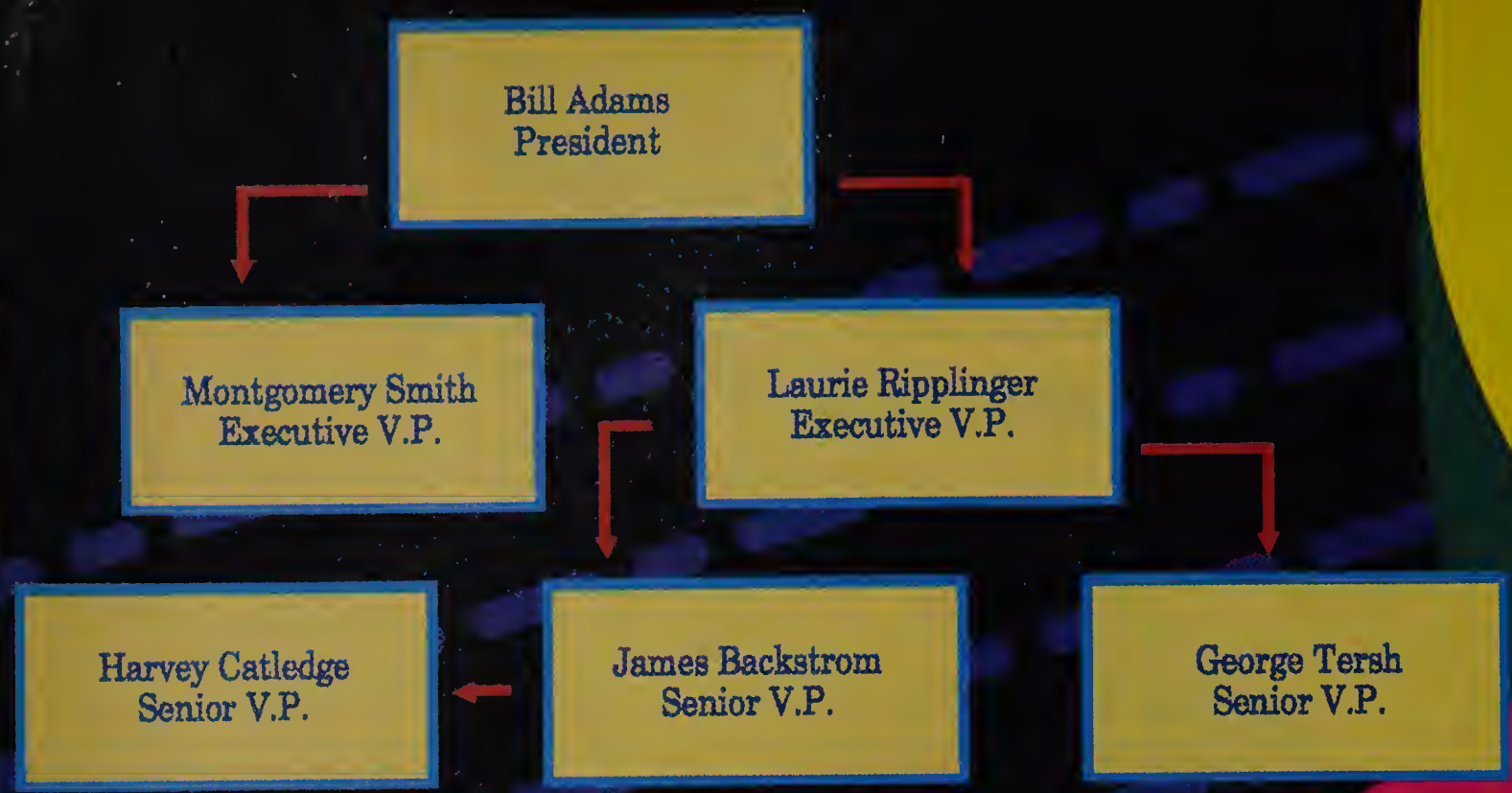

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How Does Apple Deal with Success?

In fiscal 1991 Apple Computer will ship over 1 million Macintoshes

BY JERRY BORRELL

Somewhere in the steamy heat of an Asian morning, a cargo plane sits on a corner of a vast, white concrete runway, its cargo doors propped open for the pallet-loads of Macintosh Classics being loaded into its belly.

Q: Just how many Classics does it take to fill a 747?

A: That's the wrong question. The right question is how long does it take for a cargo ship–borne container of Macs to reach Cupertino. The answer? Three months.

Apple doesn't have that kind of time on its hands. Initial projections for sales of the Mac Classic were about 450,000 for the 1991 fiscal year. By the end of the first fiscal quarter of 1991, Apple had already sold or taken orders for close to half that number, somewhere around 220,000. The LC, with sales projected at similar numbers (over 400,000) for the fiscal year, may be the same kind of runaway hit—if Apple is able to begin shipping it in quantity as planned in February. Meanwhile, the SE/30 is strictly on back order at dealers in the United States, while sales of the ci and fx continue to fare well. Apple is seemingly on the way toward solving what critics say is one of its most severe problems: shrinking or flat growth in the personal computer market.

Naturally, Apple has received the kind of press attention about the entire state of affairs that makes employees question just how the company catches so many bad breaks. A *Wall Street Journal* headline on one article screamed "Demand Turns New Macintosh into Rare Apple." The theme of the article was that someone in product planning at Apple had screwed up again. It included lots of words and phrases like *missing, widespread shortage, frustrated dealers, critical, long-term survival, dealers howling, spending huge sums on ads*....You get the picture. A *San Jose Mercury News* article headlined "Demand for Apple's Mac Classic exceeds supply" mentioned that "dealers are really mad."

Apple employees had to be wondering why the headline didn't read "At last, Mac is runaway success" but instead focused on the negative side of the wide acceptance for the company's latest product offerings. That happens to Apple a lot these days, bad press generated by even its most promising successes.

What's Going On?

The established product line—SE/30, ci, and fx—continue to sell well, but the demand for the new machines has wrought a new company (in terms of its sales) in just a few months. For its first quarter, Apple's product mix (the type of CPUs that it sells) is 80 percent different from that of the previous quarter. Demand for the Classic and LC is also hot in Europe, and keyboards and mice are in short supply. Dealers there complain that they cannot sell the few machines they have because they are not complete systems—a problem being alleviated by increasing the number of contract suppliers to Apple.

Then there is the issue of how the market decides what a particular machine is going to be used for. While Apple initially hoped to sell the Classic to businesses and tried to position the machine as a small-business computer, it is clear that the majority of Classic sales are to those of us who want a Mac at home but can't afford to drop $4000 on a color machine. So Apple continues to sell to its traditional customer base—home users. I hope that in this go-around Apple realizes that home computing is an important part of its business, and that many, if not most, home users also use their machines for business.

How the Company Is Catching Up

Needless to say, this success has the company in a furious pace of planning and activities. One answer to the overwhelming demand is a dramatic expansion of Apple's manufacturing capability. Over the past year Apple has doubled the physical space given over to its manufacturing processes. Both the Cork, Ireland, and the Singapore manufacturing facilities have built huge additions to their already impressively large plants.

Initially the Classic was to be produced in Singapore, the LC in Cork, and the si in Fremont, California. Then demand picked up and three shifts (round-the-clock) in Singapore were planned to catch up on the demand for Classics. Then Apple realized that sea shipments would lag, so it introduced air freighting. Now the Classic is being produced both in Asia and in Europe, at Apple's Cork facility. And

(continues)

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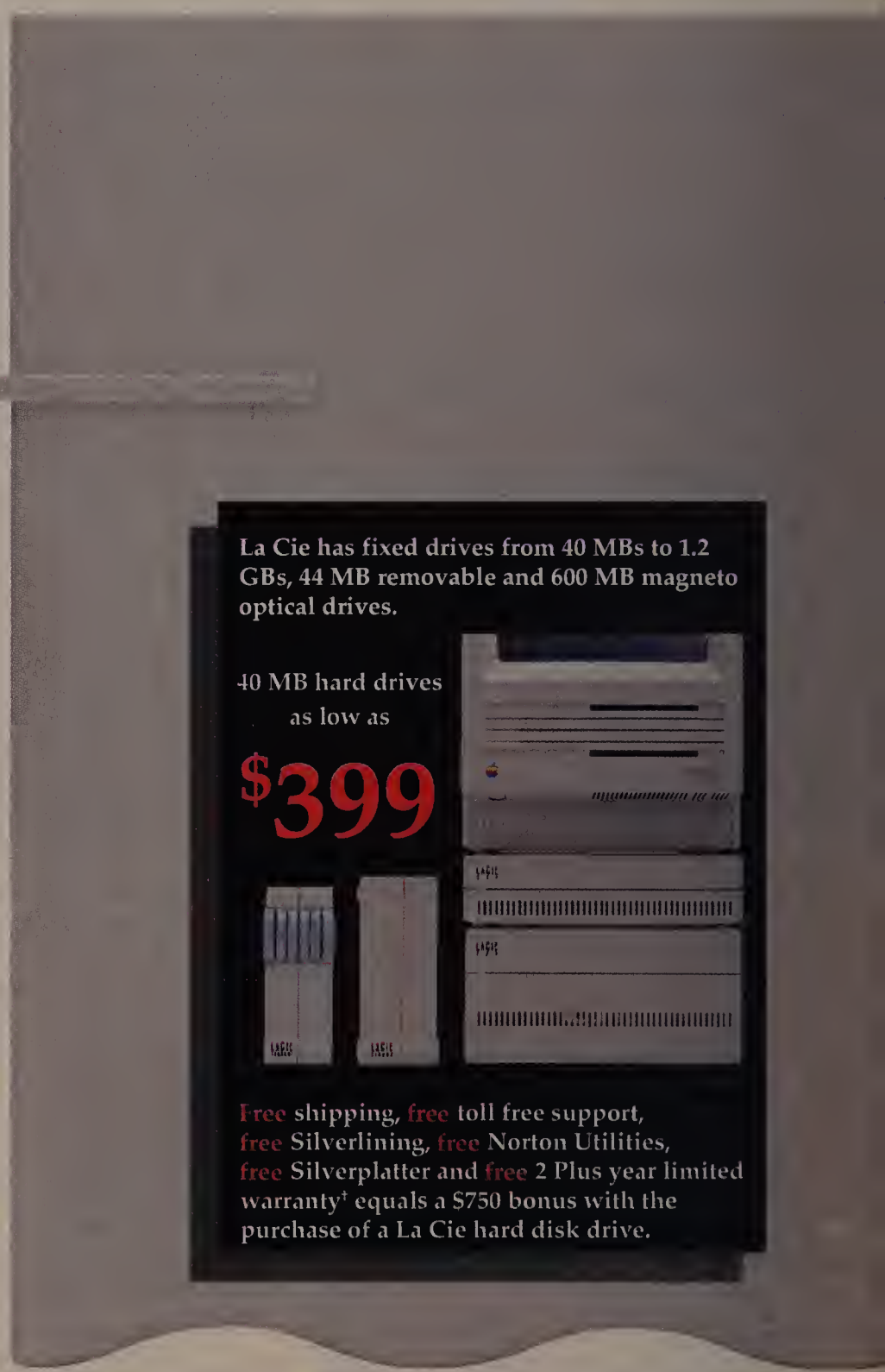
"support was exceptionally good" "I now know why my friends suggested I buy La Cie, their backup and support was exceptionally good. Not only did La Cie provide intelligent articulate instruction and advice but they even called back to learn of my progress." *Richard Woudenberg, Ridgewood, NJ*

"Perhaps you can take satisfaction in knowing that your dedicated users are appreciative of the quality you put into your product and the service with which you back it up." *Dr. David J. Hibler, Lincoln NB*



Tsunami actual size including universal power supply, silent fan and external termination switch.

"service star" "Service star La Cie has toll free support and guaranteed turnaround time for repairs. La Cie comes out on top in service and support." *Macworld, June 1990*

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drive."

David Kennedy
Langley, B.C. Canada

"fast, quiet, small and light" "I love your Tsunami drive! It's fast, quiet, small and light and I can't emphasize how wonderful it is to turn the termination on and off. Of course, it doesn't hurt that you bundle Silverlining with it–the universal formatter with no competition that I know."
Johnathan Braun, Palo Alto, CA

"La Cie offers the leading combination of software and performance." *Macworld, March 1990*

MacUser Labs show that La Cie drives best in raw speed, real-world performance, temperature and noise tests. *MacUser, February 1990*

"performed beautifully" "My productivity has increased at least three-fold. My La Cie drive has performed beautifully. It is really fast, quiet and the documentation is very clear. When I had a question and called, I got a friendly, helpful person who really took the time to explain what I needed to know. This sounds like a testimonial. Yep, I guess it is." *Craig Turner, Chapel Hill, NC*

"I love these drives. The size is perfect, the response time is great, these are the best drives money can buy. I have searched and compared price, quality and performance with other products. La Cie is the best." *Edwin E. Rivera-Juan, Hato-rey, PR*

"king of consumer choice" "If you are value conscious you'll be hard pressed to beat La Cie." *Macworld, November 1990*

"La Cie's longer warranties truly represent a good deal. The king of consumer choice." *Macworld September 1990*

La Cie's newest product Silverscanner: 24 bit, up to 600 dpi, over 16 million beautiful colors, 256 smooth shades of gray and incredible line art all in a single pass.

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Free Adobe Photoshop Limited Edition††, free Aldus PrePrint, free Silverlining and free shipping equals a $2000 bonus with the purchase of Silverscanner at only $1999.

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For product information, or to order, call toll-free

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the internal manufacturing structure has changed somewhat as well, at least in Cork. Flexible manufacturing has given way to speedier dedicated manufacturing capabilities—what Apple calls the cookie-cutter approach—so that the company can pump up the numbers of machines produced. Sören Olsson puts it succinctly: "We're not talking about just going to a third shift in Singapore anymore. We're talking about new manufacturing plants." And indeed, Apple has announced its intent to build another manufacturing plant in southern Europe in the near future.

More to Come

The changes in the volume of sales are reflected in engineering as well, where three new subdivisions of engineers look after products: high-volume (the Classic), high-performance (such as the fx), and new products. And by this summer the company will have introduced a raft of additional products—a new version of its existing portable, a low-cost (that is, under $1000) printer, and a new CPU design center, the so-called Tower machine. Innovation in product design has taken a decided leap forward in Cupertino. More machines are emerging from the prototype projects that Apple's horde of engineers have long produced.

An interesting question for Apple is how its dealers are going to handle this success and the sheer number of products. The permutations of computers, peripherals, and configurations are already confusing. It's clear that Apple will have to perform some substantive overhaul of its dealer channel. And by that I don't mean simply reducing the number of dealers (again) based upon how many Macs they sell (a policy that has reduced the number of dealers in the smaller or regional markets that Apple already serves so poorly).

An indication of the confusion, or perhaps of the number of opportunities that Apple has created, is the few add-on products that have been announced for the Classic, LC, and si. Only recently have manufacturers been able to create new add-on products for the Classic and si.

Growth May Hit 20 Percent

Apple's revenues could grow to nearly $7.5 billion this year. Significant growth that should be returned to product engineering and development. Or, Apple could get greedy and figure out ways to export its operating system to other machines, thus creating an IBM-like clone scenario, and lose control of its own destiny. The company could continue to keep its executives in splendid isolation far from the market. Or all the success could allow Apple to focus on the near-term issues of new computers and not on the long-term viability of the Mac Operating System or of third-party software and hardware developers that sell the bulk of Apple's computers. ■

Circle 220 on reader service card

Survival of the fittest.

Which color scanner is the natural selection?

Microtek Scan Original: 8 x 10 B&W print
Brightness level: n/a Input resolution: 150 dpi
File Size: 486K Output Resolution: 300 dpi
Line Screen: 133 lpi Gamma Correction: None

When it comes to selecting the right scanner, be forewarned. It's a jungle out there. You may not get the quality you were promised.

The La Cie Silverscanner has evolved beyond all that. Just look at this comparison between the Microtek 300ZS and the La Cie Silverscanner. Each image was scanned at standard settings with no corrections. This ad was then created and separated using Adobe Photoshop, QuarkXPress and a Linotronic 330.

As you can see, Silverscanner is a more advanced species of scanner which adapts better to a changing environment.

Silverscanner provides superior color, gray scale and line art over any other similar species of scanner. And as a bonus, Adobe Photoshop Limited Edition, Aldus PrePrint, Silverscan plug-in and Silverlining are included FREE with every Silverscanner purchase.

Silverscanner. More evolved. More advanced. More value. Natural selection at its finest.

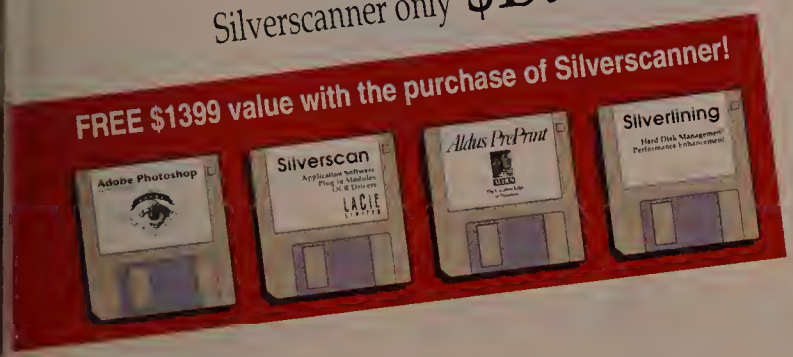
LaCie Scan Original: 8 x 10 B&W print
Brightness level: 2 Input resolution: 150 dpi
File Size: 484K Output Resolution: 300 dpi
Line Screen: 133 lpi Gamma Correction: None

Microtek Scan Original: 8 x 10 color print
Brightness level: n/a Input resolution: 150 dpi
File Size: 1,506K Output Resolution: 300 dpi
Line Screen: 158lpi Color Correction: None

La Cie Silverscanner: 16 million beautiful colors, 256 smooth shades of gray, incredible line art, up to 600 dpi all in a single pass.

LaCie Scan Original: 8 x 10 color print
Brightness level: 2 Input resolution: 150 dpi
File Size: 1,502K Output Resolution: 300 dpi
Line Screen: 158 lpi Color Correction: None

Silverscanner only **$1999!**



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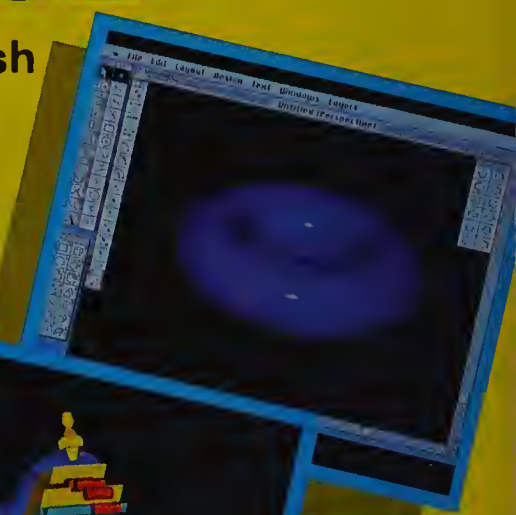
AW...WHAT THE HECK!

DesignCAD 2D/3D

Professional CAD System for the Macintosh



When we introduced this product we had to ask ourselves, "What should DesignCAD cost?" To help with our decision we hired accountants. We consulted with industry "movers and shakers". We purchased the finest spreadsheets available. Many people said, "The software should sell for $3,000.00 or more." Others said, "It's good, darn good—sell it for at least $2,000.00." Opinions varied. Finally we said, in the Great American Tradition, "Aw . . . What the Heck! Let's see the competition beat this **$699.00.**

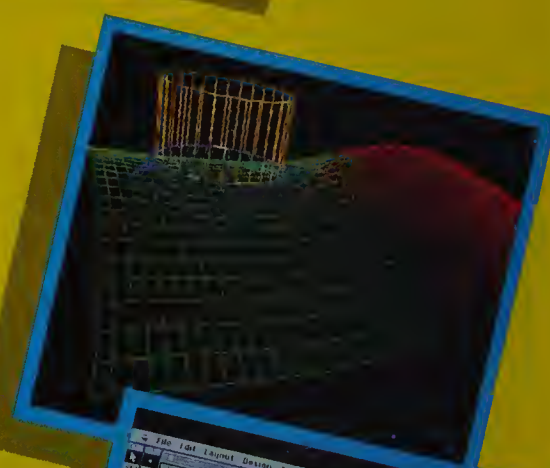
DesignCAD has disproved a common misconception about computer software: you don't always have to spend a lot of money to get high-power quality software. DesignCAD for the Mac has features of CAD systems costing thousands of dollars! Yet, DesignCAD is priced at least 50% to 80% BELOW comparable CAD packages . . . **AND DESIGNCAD IS BETTER!**

Excellent Software Compatability!

Along with extensive hardware support, you get software compatability! DesignCAD comes with (at no extra charge, of course!) file transfer utilities to let you read and write files in other formats such as IGES, DXF, HPGL, XY or XYZ coordinates, ASCII text files, EPS, Postscript and PICT or PICT2. **NOW THAT'S COMPATABILITY!**

DesignCAD offers fully integrated 3D geometry!

Need 3D capability? Great! Look at how DesignCAD fully integrates its very powerful 3D mathematical foundation with excellent 2D drafting attributes, which are in a league all of their own, offering first-rate ease of learning and use.



DesignCAD is easy to use!

Tests prove that DesignCAD's user-friendly interface allows you to quickly produce complicated drawings in a fraction of the time required from the competition. Flexibility and power found within DesignCAD means you save **time** and **money**! DesignCAD is truly the CAD system that ANYONE can use!

The Power of Intelligence!

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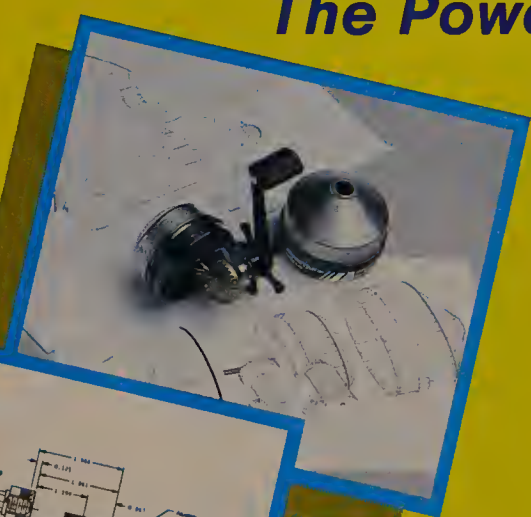

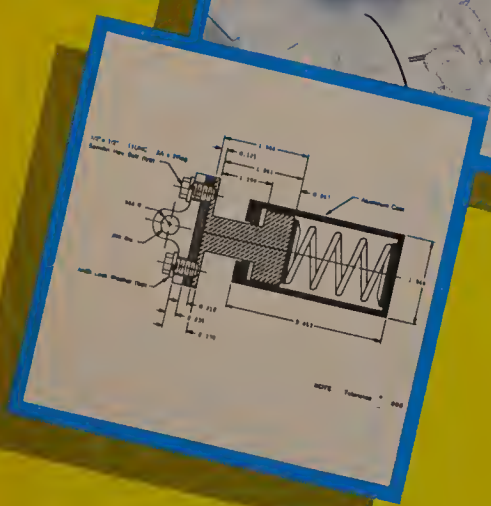

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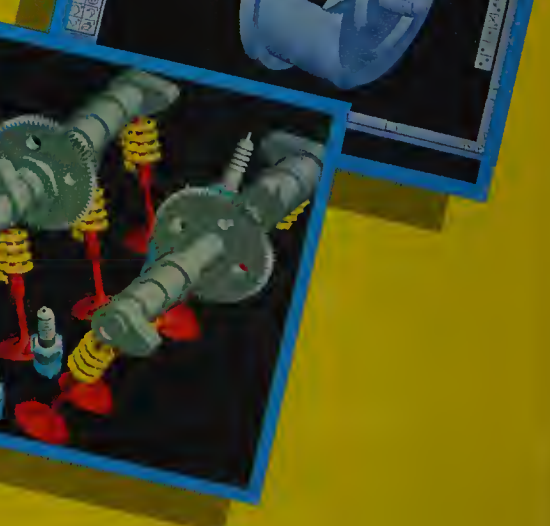

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LETTERS

WARD SCHUMAKER

Curley, Larry, and Mac

The three stooges are alive, and going by the names of Classic, LC, and IIsi. In 1986 Apple had the right machine at the wrong price, but now, four years and a little cosmetic work on the Plus later, they give us the wrong machine at the right price. (After all, it does have a 7-year-old CPU.) The best thing the introduction of the LC will accomplish is to stimulate the market for used Mac IIs. (The wisdom of providing slots but requiring adapters to use them still escapes me.) Actually the IIsi, being the easiest to fix, is not so bad. A simple spacer to expand the case back to full-height will solve most of its problems. It offers value with the least compromise and fewest gimmicks. Best of all, it's the only one of the three that's not obsolete right out of the box.

Paul Looney
Los Angeles, California

Unfounded ELF Scare?

In your *Commentary* (December 1990) you have become an unwitting contributor to an unfounded fear of ELF electromagnetic fields. At worst, this scare is equivalent to the "cold fusion" euphoria of two years ago, and at best it represents irresponsible science and journalism. My assessment is based on calculations of field strengths and currents using standard electromagnetic theory and known electrical properties of cells. I refer the technically trained reader to a convincing presentation of these calculations and results by Robert K. Adair in *Physics and Society,* volume 19, number 4, October 1990, published by the American Physical Society.

Harmon W. Hubbard
Los Angeles, California

VDT Victim?

I may be one of the "early" victims of VDT radiation. I was a fanatical computer hacker in the 1980s, and all that I know or have done for the last 10 years is with computers. In 1986 I had a malignant cancer removed from my eyelid, near the tear duct. My doctor suggests it was caused by exposure to the sun, but I am a fair-skinned redhead and take precautions in the sun. I suspect the cause could be linked with overexposure to VDT screens. Three cheers for your efforts to let others know of possible hazards.

Carol Barnaly
British Columbia, Canada

Misfortune 500

Increasingly, *Macworld* seems to be talking to a different Mac world—either the very elite or those in big business. As a home user, it concerns me that each issue appears to be catering less to the individual user's needs and more to corporations or multiuser setups. Not all of your readers have fx's connected to multigigabyte drives, newspaper-size color monitors, flatbed scanners, MIDI synchronizers, state-of-the-art video systems, and a coffee machine. Do my 5MB cx, ImageWriter LQ, 40MB drive and 2400-baud modem make me the sole candidate for the misfortune 500?

Dale Mullen
Nova Scotia, Canada

We make a concerted effort to meet the needs of home users too. "Is Your Mac Obsolete?" February 1990, which covered upgrade strategies, is only one example of features geared toward the more basic system. Our regular *How To* columns, *Insights, Quick Tips,* and *Getting Started,* also provide information useful for the beginner to advanced user, and the *New Products* column covers products in every price range.—Ed.

(continues)

Corrections

MacBulletin *(December 1990) incorrectly stated that Ariel Corporation is the only digital signal processing board based on the Motorola DSP56001 chip, intended for use with the Mac II. Digidesign also ships 56001-based DSP boards.*

In our September 1990 article, "Best Buys in Low-Capacity Drives," the per-

(continues)

INTROD
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[illegible] and better [illegible]

TurboTax. The tax preparation software designed for your Macintosh, that's like having someone to help you, and hold your hand while you [illegible]

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It guides you through preparing a tax return step by step. More than 60 commonly used forms, schedules and worksheets are included.

If you run into tough tax terminology, TurboTax will use a hypertext format to translate it into easy English.

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TurboTax guides you [illegible] rising and [illegible] expenses and income. Then [illegible] your return in over 250 areas to help ensure no mistakes in [illegible] calculation, or any missed savings opportunities slip through.

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So there's little worry that anything on your return might flag the IRS.

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Now TurboTax has come to the Macintosh.

And, for even more people, thankfully, taxes will never be the same again.

formance figures for the GCC UltraDrive 45 (S) and the GCC UltraDrive 40 (Q) were transposed.

The H-Server from Solana Electronics ("Networking for the Novice," December 1990) is $2195.

The president of New Era ("The Year in Review," January 1991) is Dean Meyers. Sal Patalano is the vice president.

We incorrectly listed the makers of SimCity in Best Sellers, *January 1991. The software is produced by Maxis.*

*The price for Address Book Plus 2.0 from Power Up Software (*Updates, *January 1991) is $99.95. The company's phone number is 415/345-5900.*

*Craig Hickman is no longer selling KidPix directly (*Conspicuous Consumer, *January 1991). Starting in February, an expanded version will be available through Broderbund. Also mentioned was Easy Envelopes+ 2.02; it has no limit on the number of searchable addresses.*

. . . . . .

Reality Check

I think our Mac vendors need a reality check. An 80286 NuBus board retails for approximately $1400, yet you can purchase an 80286 PC clone with 1MB memory, 40MB hard disk, monitor, and keyboard for $1200. Who in their right mind would purchase the NuBus?

Recently I read that one vendor was going to offer an 80386SX add-in board for $2300. Well, you can purchase a 16MHz 80386 PC clone with 2MB memory, a 40MB hard disk, monitor, and keyboard for $1800. I think there's a screw loose somewhere. No wonder the IBM/Microsoft/clonemaker combination is kicking our behinds.

Trevor LeGall
Bloomfield, New Jersey

CPU Scoop

I am really ticked with you guys. For months now, I have been waiting for a report on the three new Mac CPUs to help me choose my next purchase. I finally got the November issue in the mail and still saw nothing. Then one day, I walked into a local bookstore and saw a "newsstand copies only" edition of the November issue. This version had a major article describing the new Mac systems in full.

Special newsstand only issue?! If anybody should get the special issues, it should be loyal subscribers.

William Bruchert
Chicago, Illinois

We were able to publish a sneak preview only in our newsstand issues because of press embargo dates related to Apple's announcements—our subscribers receive their issues a week or more before newsstand readers. Sorry! We hope you liked the in-depth coverage in December.—Ed.

Depreciating the SE

I have finally had it with Apple. I bought the Mac SE one year or so ago and had it only two months before the SE/30 came out, immediately depreciating my SE by about $400. Now with its new line of

(continues)

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How would you like a Macintosh® network that runs astonishingly fast, becomes more powerful as it grows, and never goes down? You can have all this and more with DataClub™ — the breakthrough in file server software.

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But we didn't just double the raw output speed, we made it easier to use. We included direct scan support, so you can fax art and photos straight from the scanner with excellent resolution. We also made the software easier to use—it's as simple as printing to any printer. And we made the InterFax work in background (with or without Multifinder), so you can get back to work while your Mac faxes. You can even schedule when faxes are sent to take advantage of lower phone rates.

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Introducing the Interfax 24/96

CPUs Apple is going to turn the screw again. Apple does not care about loyalty and makes it impossible for the small business or the home computer user to keep up with growing technology.
Timm Gearhart
Thomson, Georgia

A Matter of Bits

The 68020 is a full 32-bit data address device. Lon Poole refers to it as a 16-bit data device ("The Macintosh Family Evolves," December 1990). Better retract this unless you know of a new variation of the 68020.
Ray Houghton
Portland, Oregon

The 68020 CPU does process data 32 bits at a time once the data is in the CPU. However, the CPU must access memory twice for each 32 bits because the LC's 68020 has a 16-bit data path for moving data between the CPU and memory.—Ed.

Privacy and Prodigy

Thank you for Steven Levy's *Iconoclast* column in your January 1991 issue. It's nice to see something in print regarding Prodigy's contempt for its subscribers' privacy and free speech. The online community cannot allow the dangerous precedent that Prodigy has set to stand.
Dave Walker
Ecorse, Michigan

Wake Up and Smell the Carbide

In your *News* story (November 1990) you printed a photo of a Union Carbide plant captioned "A Syzygy-using Union Carbide plant in Bound Brook, New Jersey. Integration of E-mail with project-tracking helps the chemical giant comply with environmental regulations." It had me rolling on the floor with laughter.

I live less than 2 miles away from this plant and I can tell you that several months ago, Riverview Diner, located across from the chemical plant, was demolished because Union Carbide "allegedly" used that land to illegally dump toxins (asbestos fibers, mostly).

I don't have any gripe about Syzygy, but the Union Carbide plant mentioned has been an environmental eyesore to the community since the day it went up.
Steve Godun
Piscataway, New Jersey

Union Carbide declined to respond.—Ed.

Spelling Checker Shenanigans

A spelling check on a recent document I was working on questioned my use of the word *childcare*. The editors of Microsoft's dictionary, however, were able to offer only one alternative: *kidnapper*.
Dave Grupper
Brooklyn, New York

Letters should be mailed to *Letters, Macworld,* 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370,702) or MCI Mail (284-8078). Please include a return address. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*

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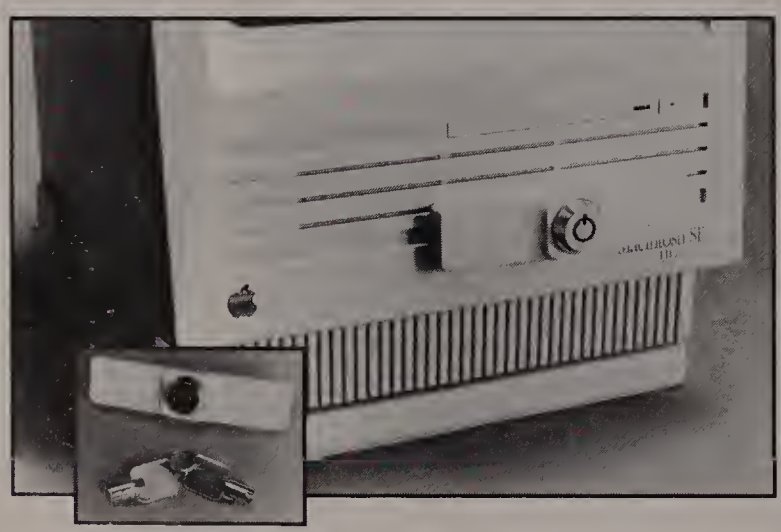

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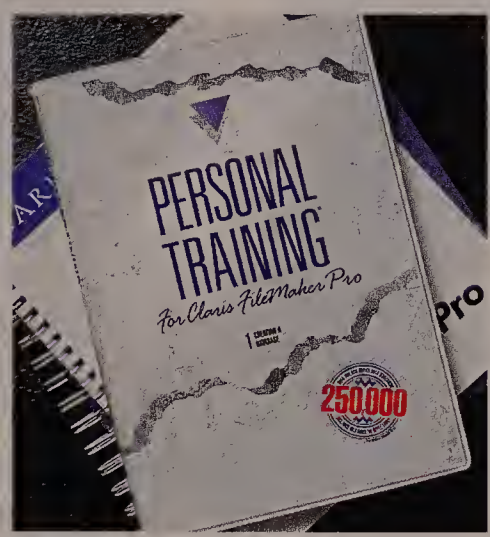
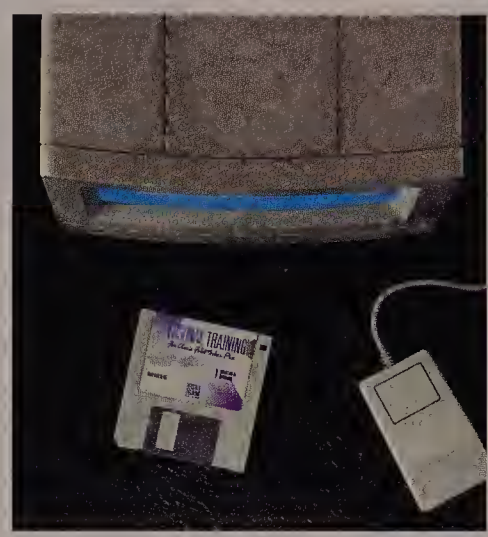
Four Ways to Recognize a More Productive Mac User

The most obvious sign is the PTS package — usually on top of software manuals that no longer have to be read.





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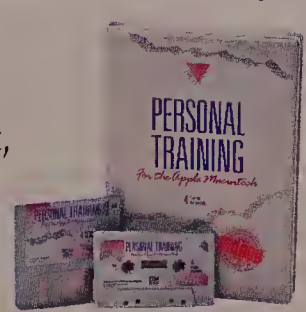

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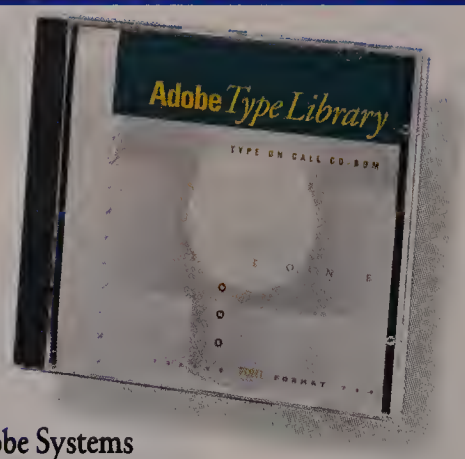

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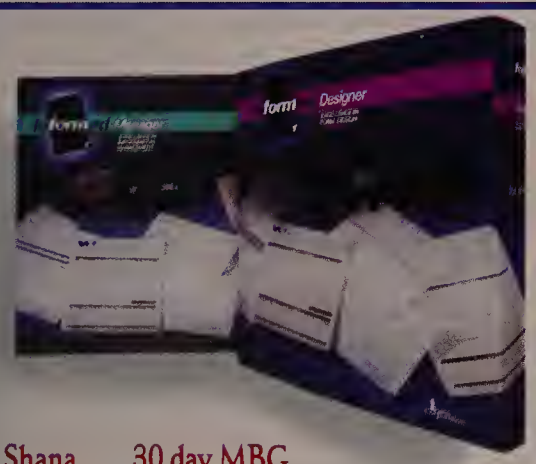

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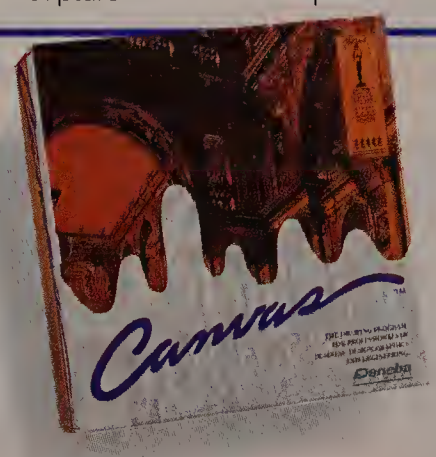

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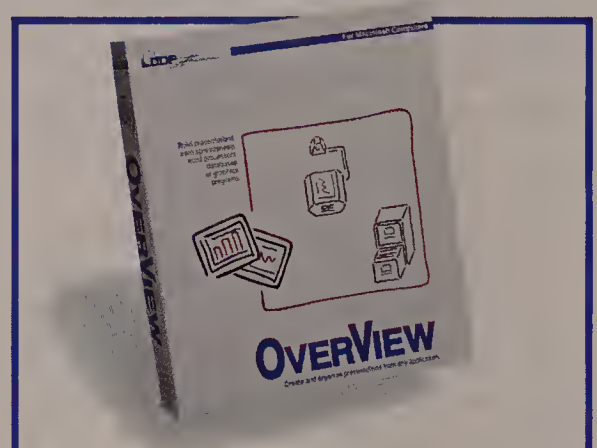

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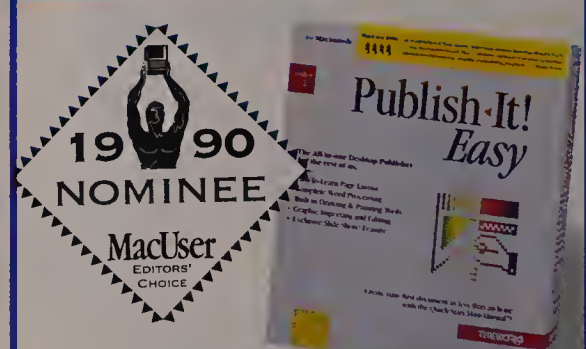

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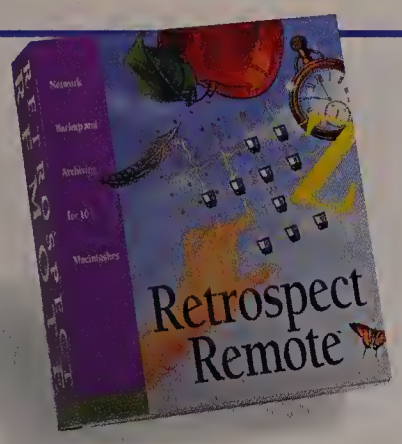

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6087 Smart Alarms 3.0 *(5-8 users)* . . . . . 187.

★Kent Marsh Ltd. ... 30 day MBG
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8561 911 Utilities . . . . . 89.

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6739 Prototyper 3.0. . . . . 184.

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★Preferred Publishers ... 30 day MBG
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7403 Partner 1.01 . . . . . 56.

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3449 SuperGlue II 2.01 . . . . . 75.

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5724 Symantec Utilities for Mac *(SUM II)* . 99.
6748 Norton Utilities for the Mac 1.0 . . . . 84.
3421 THINK Pascal 3.0 . . . . . 165.
3420 THINK C 4.0. . . . . 165.

★Synex ... 30 day MBG
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7872 Software Bridge 1.0 . . . . . 79.

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8273 Mathematica Enhanced 1.2 . . . . . 699.
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8125 Cosmic Osmo *(CD-ROM)* . . . . . 46.
Broderbund Software
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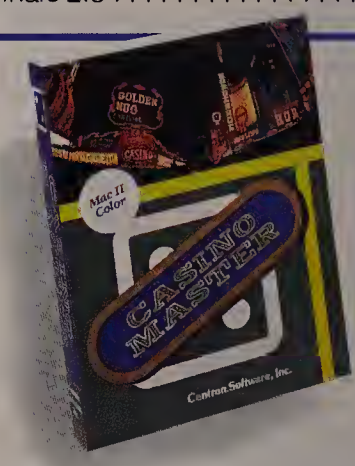
8524 Casino Master *(Color version)* . . . . . 45.
Coda Music Systems
8188 MusicProse 2.0 . . . . . 299.
5604 Finale 2.5 . . . . . 549.



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6611 Kanjimaster - Beg. *(Japanese)* . . . . 105.
8026 Easy Kana . . . . . 139.

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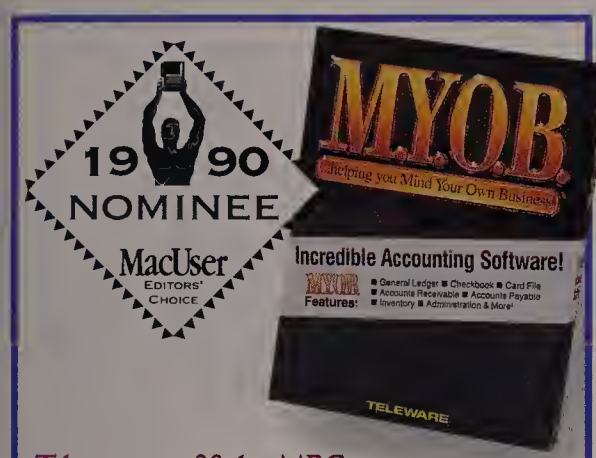

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★Mysterium Tremendum ... 30 day MBG
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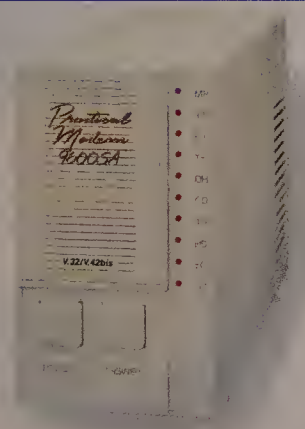

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5773 Strategic Conquest Plus 2.055 . . . . 34.
5774 NetTrek—The Real Version 3.0 . . . . 34.

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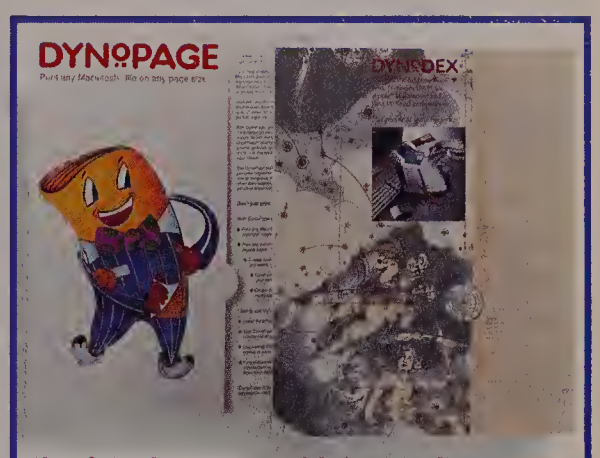
8365 DataLink Express . . . . . 175.
8364 DataLink/Mac. . . . . 209.
8363 DataLink/Mac Portable . . . . . 209.

★Beagle Bros. ... 30 day MBG
7691 Flash 1.1. . . . . 127.

★CE Software ... 60 day MBG
5173 QuickMail 2.2.3 *(10 user)*. . . . . 315.



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6916 *Dynodex 2.0*–Fastest address manager. Prints double-sided organizer pages, labels, envelp. $72.
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8720 DaynaTALK for Mac (5 Pack) . . . . 389.
8721 DaynaTALK for Mac (10 Pack). . . . 695.

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8077 AllShare 1.0 . . . . . 139.

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6371 Timbuktu/Remote Access Pack . . 845.
8707 Liaison 3.0 . . . . . 259.
6273 PhoneNET StarConnector 10-Pack . 129.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
2206 PhoneNET StarController 300 . . . . . 825.
6687 PhoneNET StarController-EN . . . . 1599.
6766 MediaTracks . . . . . 189.
6768 MediaTracks Multimedia Pack . . . . 319.

★Freesoft ... 60 day MBG
6115 White Knight 11 . . . . . 85.

Hayes
2300 Smartcom II 3.2 . . . . . 84.
2307 Smartmodem 2400 . . . . . 349.
5991 V9600 Baud Modem . . . . . 689.

Information Presentation Tech.
8060 Personal Server Network *(PSN)* . . . 108.

Insignia Solutions
7557 Access PC 1.0 . . . . . 62.
7058 SoftPC-AT/EGA Module . . . . . 125.
4089 SoftPC 1.3 . . . . . 245.

Intel Corporation
5119 2400EX Modem . . . . . 179.
6420 2400EX MNP Modem . . . . . 229.
6650 2400EX MNP with QuickLink II . . . 249.

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8580 DataClub 1.1 *(10 user)* . . . . . 539.

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7588 Drive 360 . . . . . 249.
7590 Drive 1200 . . . . . 249.
5632 Drive 2.4 *(includes FastBack II)* . . . 325.

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7465 CarbonCopy Mac *(Twin Pack)* . . . . 169.
8027 MacModem V.32 . . . . . 689.

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6272 NuvoLink SC . . . . . 389.

★Orchid Technology ... 30 day MBG
6949 OrchidFAX Modem . . . . . 429.

★Practical Peripherals ... 30 day MBG
3102 2400 Baud External Modem . . . . . 179.
5285 PM2400SA MNP Modem . . . . . $209.
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3089 Mac Communications Pack 1.5 . . 225.

★Prometheus ... 30 day MBG
8762 Travel Modem . . . . . 195.
8350 2400 Mini for Mac . . . . . 159.
8348 24/96 Minifax . . . . . 199.
8349 Maxfax . . . . . 295.
8709 2400M Plus . . . . . 249.
8738 9600M Plus . . . . . 699.

★Shiva ... 30 day MBG
3444 NetSerial . . . . . 275.
4347 NetBridge . . . . . 339.
4942 TeleBridge . . . . . 339.
3443 NetModem V2400 . . . . . 429.
6917 NetModem V.32 . . . . . 1395.
6519 EtherGate . . . . . 1629.
8189 FastPath IV . . . . . 1899.

★Sitka/TOPS ... 30 day MBG
4188 TOPS Teleconnector *(DIN8)* . . . . . 23.
4598 TOPS Flashbox . . . . . 119.
3720 TOPS Flashcard . . . . . 155.
6264 TOPS Networking Bundle 3.0 . . . . 187.

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6720 FAXGATE Plus 1.1.2 . . . . . 239.
8337 CommGate . . . . . 379.

★Synergy ... 30 day MBG
6618 VersaTerm 4.1.1 . . . . . 88.
6619 VersaTerm-PRO 3.1.1 . . . . . 174.

★Traveling Software ... 60 day MBG
3729 LapLink Mac III Connectivity Pac . . 93.

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★Abaton ... 30 day MBG
7432 Scan 300/GS *(reqs. Scan Kit)* . . . . 999.

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5895 UPS 110SE . . . . . 209.
6686 UPS 370ci . . . . . 329.

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8124 Typist . . . . . 479.
4476 OmniPage 2.1 . . . . . 495.
OmniSpell 1.0 or OmniDraft 1.0 ea. 69.

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8815 DS-3000 Scanner w/OmniPage . . 1099.

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8271 ColorSnap 32+ . . . . . 649.

★CoStar ... 30 day MBG
6090 LabelWriter . . . . . 185.
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6901 Switchboard *(modular keyboard)* . 159.
MAC-101 Keyboards . . . . . ea. 129.

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8586 40 MHz PowerCache IIci . . . . . 949.
8585 50 MHz PowerCache IIci . . . . . 1689.
8583 SCSI PowerCard . . . . . 949.
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8572 25 MHz PowerCard 030 *(IIcx)* . . . . . 1495.
40 MHz PowerCard 030 *(II or IIx)* ea. 1399.
8566 40 MHz PowerCard 030 *(IIcx)* . . . . . 1749.
50 MHz PowerCard 030 *(II or IIx)* ea. 1895.
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GDT Softworks
6256 PrintLink Collection 4.0 . . . . . 59.
6151 JetLink Express 2.0 . . . . . 89.

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4 HP LaserJet III *(with toner)* . . . . . 1699.
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3 MacVision 3.1 . . . . . 259.
Kodak
0 DICONIX M150 Plus Printer . . . . . 489.
★Kraft Systems ... 60 day MBG
9 KM30 ADB Joystick . . . . . 42.
★Logitech ... 30 day MBG
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3 9CM080 14" Color Monitor . . . . . 529.
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19" 8-bit System for SE/30 or II. ea. 4395.
0 19" 24-bit Color System for Mac II 6795.
19" G/S System for SE/30 or II ea. 1995.

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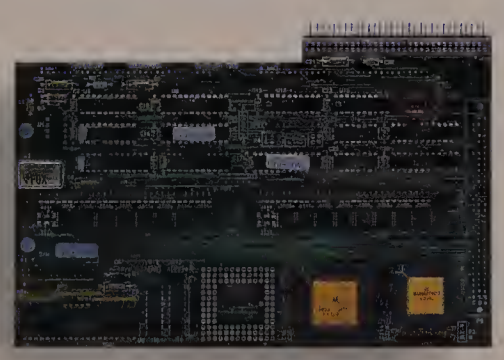

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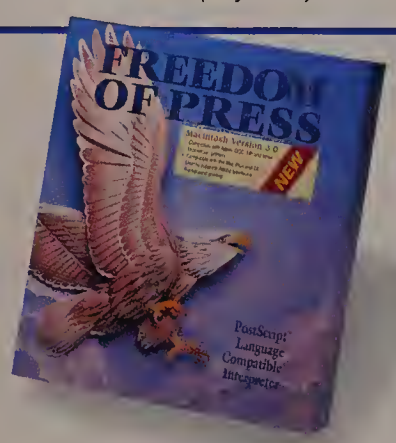

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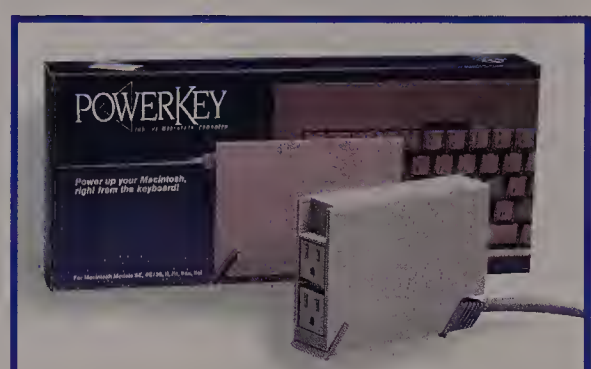

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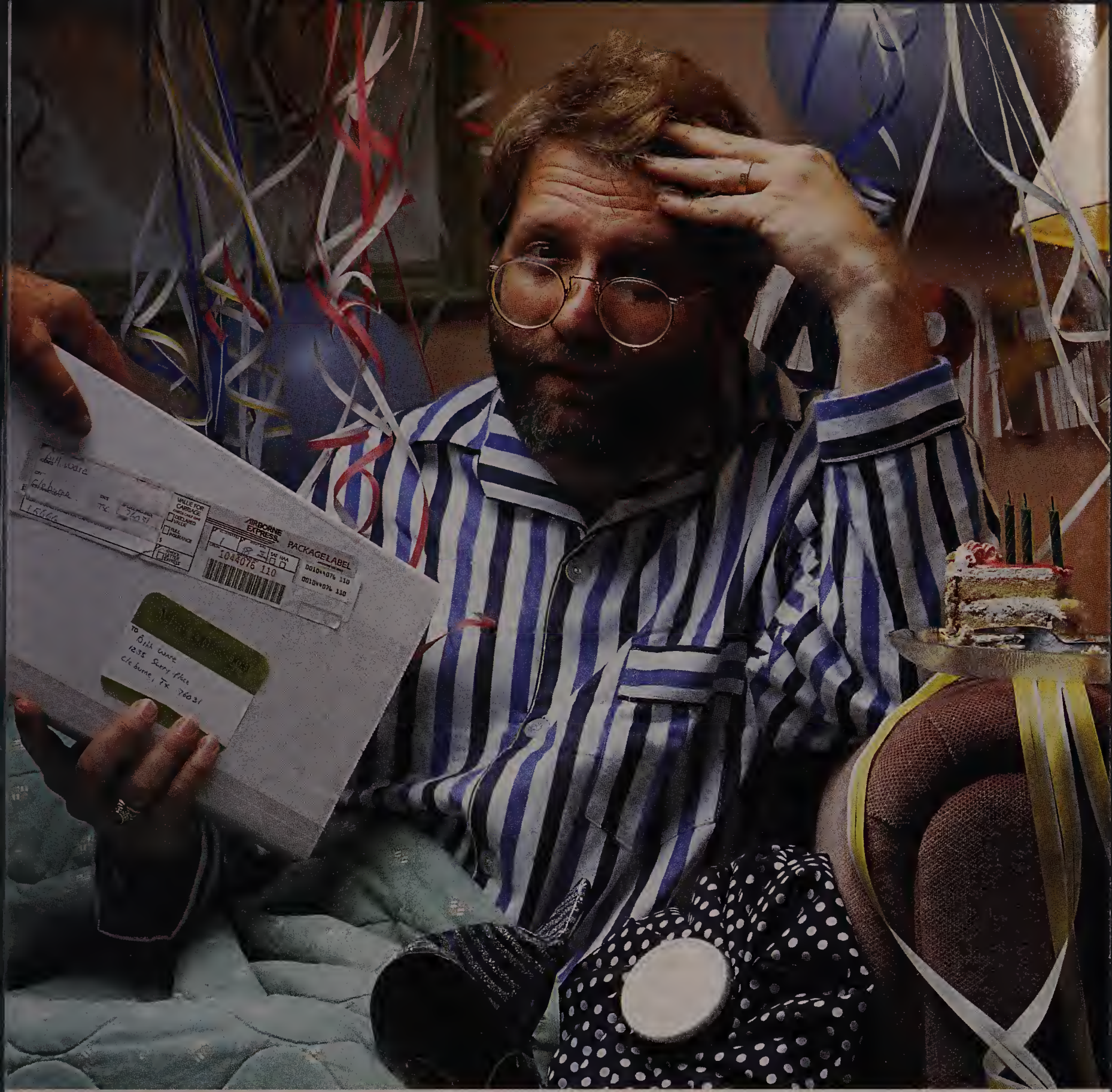

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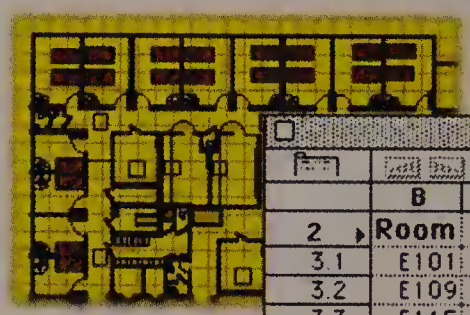

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ART BEAT

by Cathy Abes

The tools and the talent behind Macworld's graphics and the techniques that make them possible

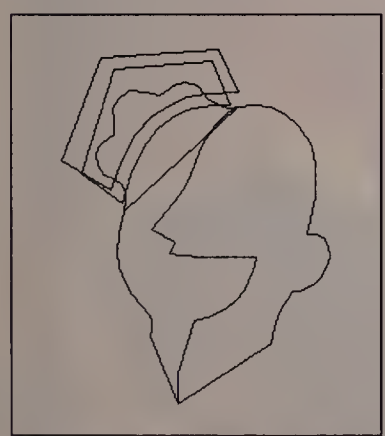
Artist: Until recently an illustrator for the *San Francisco Chronicle*, Ron Chan says he likes to completely plan out his illustrations before he starts rendering them. "I need to be organized," he says, "working on one section of the illustration at a time, building up from the bottom." He has experimented with different techniques for creating gradations, several of which he used in this illustration.

Tools: Mac IIcx with 4MB of RAM and an internal 80MB hard drive; Microtek color scanner; Illustrator 3.0.

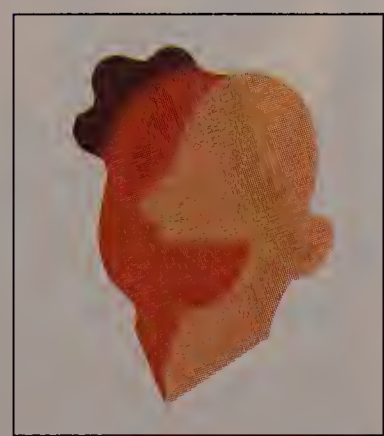
How It Was Done: For our feature on building a toolbox of Mac utilities ("Tools of the Trade"), Chan began his illustration by drawing a rough pencil sketch, which he scanned into Illustrator 3.0. After he blocked out all the shapes, he selected process (CMYK) colors for the various parts of the drawing by entering the correct percentages of cyan, magenta, yellow, and black for each. Once he had fine-tuned all the shapes and colors, he began creating gradients for several different parts of the drawing.

The first area Chan focused on was the face. Since it was made up of numerous curved paths, he decided to break them down into smaller paths so they would be easier for the Mac to process and print. To create the shadow that covers the left side of the face, he selected all the points along the outside edge of the shadow shape except the two endpoints (because Illustrator always tacks on the segment that follows each selected end point). After copying that area, he selected Paste in Front (⌘-F) from the Edit menu to place

(continues)



After creating the shadow shape for the face, Chan used two rough shapes encompassing the hair to create the blend along the hairline.



This is how the face looked after Chan created the shadow for the face and the blend between the hair and the shadow.

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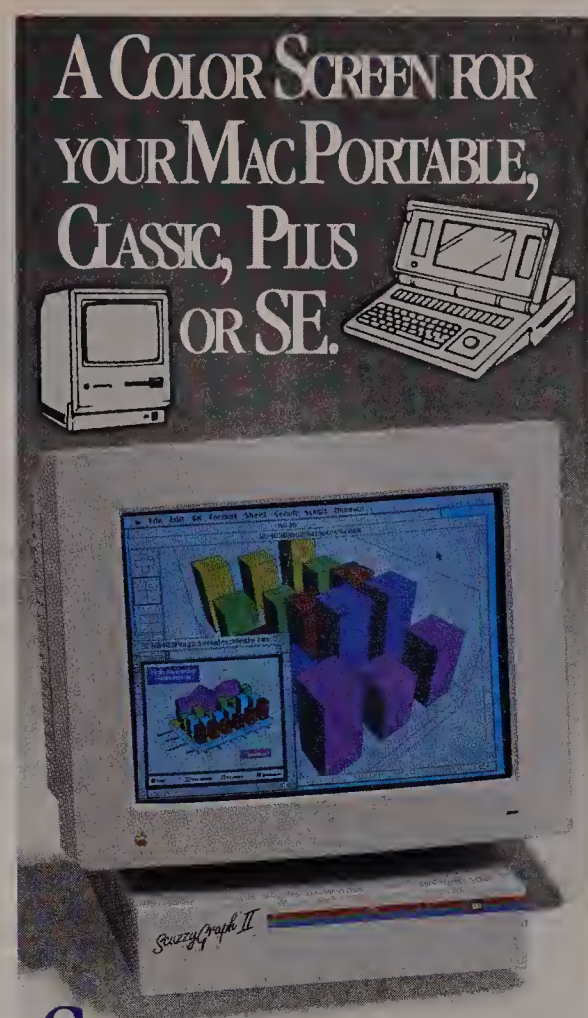

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Copying the shirtsleeve shadow shape and dragging it away from the original produced a slight bulge protruding from the left side of the shadow.

Making the original shape into a mask eliminated the bulge once the blend was created between the shirtsleeve and the shadow.

the duplicate directly over the original. Finally, Chan drew the rest of the shape that defined the shadow of the face.

Then, to blend the man's hairline into the shadow of his face, Chan first selected all the points that defined the hair (except the two endpoints), copied the hair shape, and pasted it in front. After that, he closed the path by pressing Option-⌘ to select the shape and ⌘-J to join it. Chan says he prefers this shortcut over the more cumbersome method of selecting the two endpoints and choosing the Join command.

Next he made the hair into a mask, first changing its fill to None because it would be easier to use as a mask only than as a mask with a color shape. Then he drew a rough shape around the mask, copied the shape, and dragged the copy away from the original just enough to create the narrow blend area he wanted. Finally, he blended the two rough shapes to achieve the feathered look he wanted.

Chan created the mask to keep the color within the boundaries of the hair. He used the two rough shapes (rather than the hair itself) to define the blend—for several reasons. Because he didn't need a precise shape for the blend area, it was faster and easier to draw and duplicate the rough shape than to duplicate and align the curves of the far more complex hair shape. Also, the straight lines of the rough shapes required less storage space and less processing time than the curved lines of the hair did.

For the next blend—between the top of the shirtsleeve along the man's shoulder and the shadow falling across it—Chan used a different technique, since unlike the hair, the shadow shape did define its blend. After drawing the sleeve and the shadow, he selected the shadow shape, copied it, and pasted it in front (⌘-F)—just as he had with the shadow on the face and the hair. Next he clicked on the two points that defined the part of the curve he wanted to feather and dragged the top layer (the duplicate) down and away from the bottom layer (the original). After changing the color of the original shadow shape from taupe to white—the color of the sleeve—so he'd have two different colors to blend, Chan made the original shape into a mask. Then he grouped the original with the duplicate and blended the two shapes.

Masking the original shape knocked out everything beyond the border of that shape; without the mask, the color would have extended into the slight bulge created when Chan dragged the copy away from the original shape. Grouping the two shapes ensured that the mask would define only those shapes, rather than affecting the rest of the illustration. M

The final illustration.

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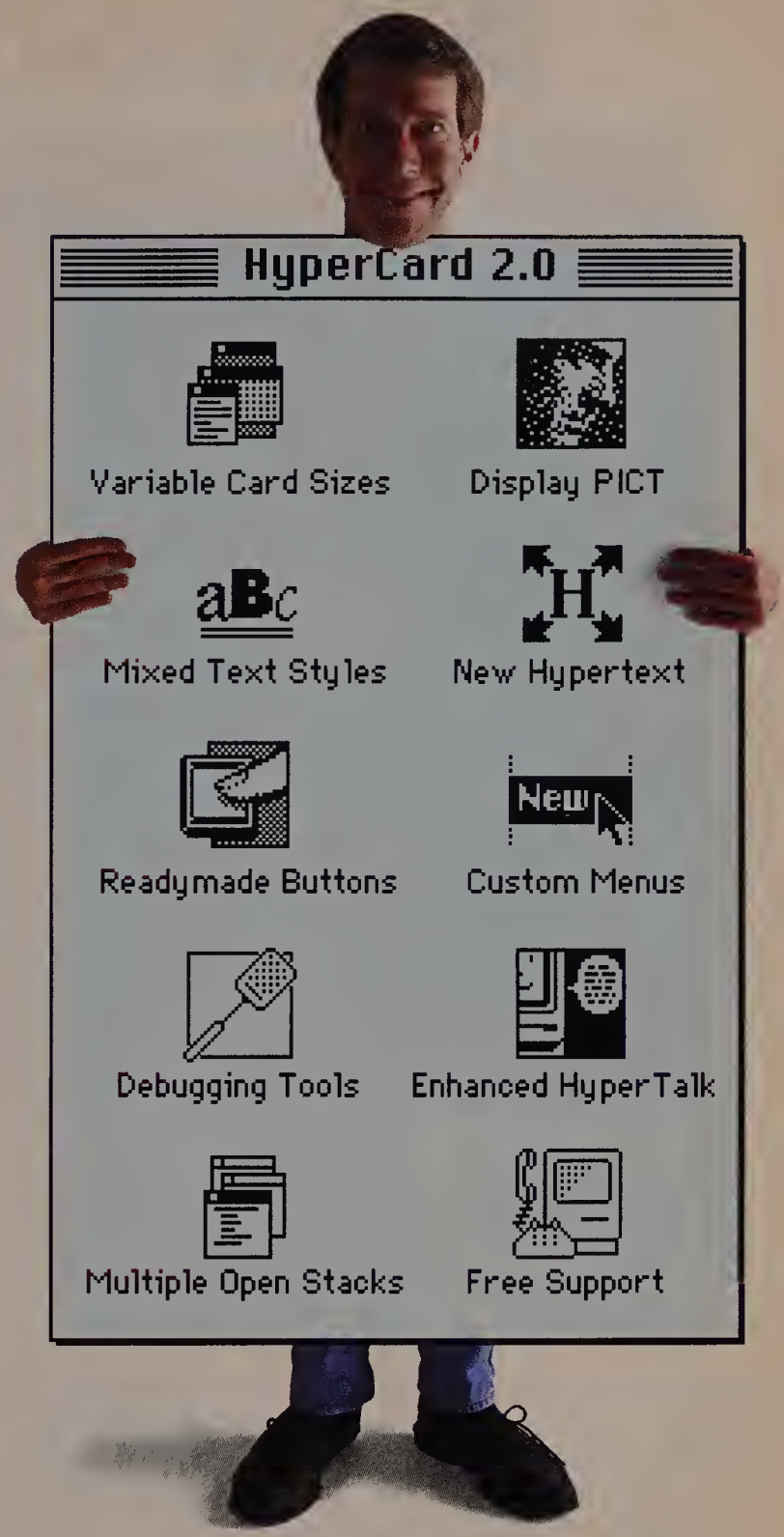

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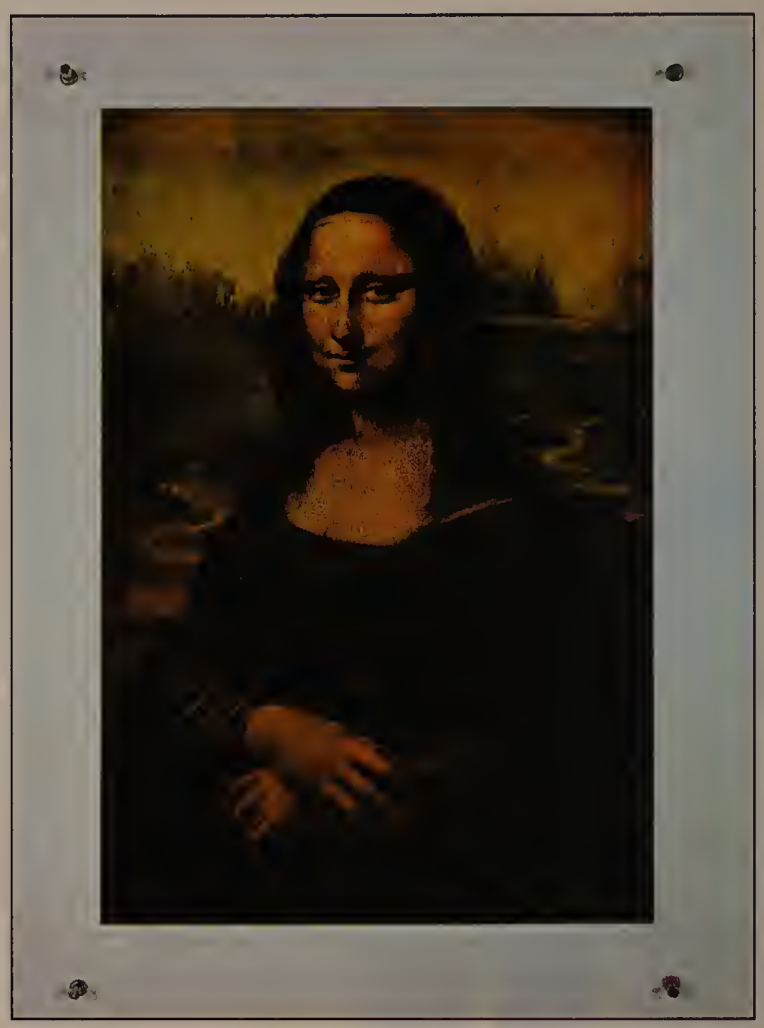

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Circle 313 on reader service card

Search and Destroy

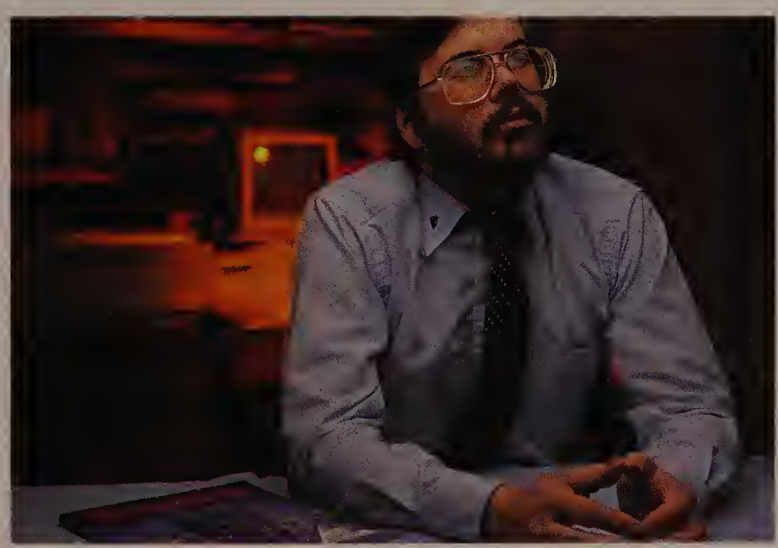
What happened when the Secret Service visited Steve Jackson Games

BY STEVEN LEVY

Twenty-seven hundred 'A' Metcalfe Road is located in the city of Austin, State of Texas, County of Travis. Said address is a two story square building measuring approximately 50 feet on a side located on the south side of Metcalfe Street. The bottom story is multi-colored brick face and the upper story is white wood frame construction."

This is how the warrant authorizing the United States Secret Service to search the premises of Steve Jackson Games, Inc., describes the location of a raid conducted on March 1, 1990. Special agent Timothy Foley, who flew in from Chicago for the event, and several of his colleagues apparently had no trouble finding the target. They were there early, before the first employees arrived at the (noncomputer) role-playing game company. By the time the astonished workers showed up, including proprietor Steve Jackson, the Secret Service agents, wearing shiny windbreakers and armed with handguns, were already at work, ripping drawers and closets open, collecting computer equipment for confiscation, and barring access to Jackson and his workers.

Thus began an episode that is startling in and of itself, but is also potentially significant in the issues it raises concerning law enforcement—and abuse—in the age of computers. But first back to 2700 "A" Metcalfe Road.



STEVEN PUMPHREY

Steve Jackson nearly lost his business, thanks to the Secret Service.

Trashing the Duke

"They said they had a warrant," recalls Jackson, an affable bearded fellow in his thirties. The warrant authorized the agents to search his offices and remove items relating to certain alleged crimes. But the paper they flashed did not explain why Steve Jackson's company was suspected of harboring information relating to a crime, nor even what that crime might be. Generally, communication between searchers and searchees was minimal, according to Jackson, as demonstrated by the agents' insistence on forcibly breaking open closets and drawers when the nearby keybearers were perfectly willing to unlatch the locks to prevent damage.

After several hours, the U.S. government ended its visitation. Among the remains were greasy Whataburger wrappers from the agents' breakfast and a Dukakis for President sticker one Secret Service agent had apparently pulled off a wall and shredded. Not among the remains were three computer systems, several hard drives, a number of floppy disks, a laser printer, a pocket calculator, and stacks of paper files. The confiscated computers had held all the information for the game Jackson was preparing for release, as well as a working bulletin board system that focused on discussions of science fiction and gaming.

Naturally, Steve Jackson tried to get his hardware and his files back. Because without that data, he was unable to publish a game that was crucial to the financial health of his company—advance orders had already been taken. As it turns out, this game, called GURPS Cyberpunk, had a plot that involved a computer break-in. And when Jackson went to the local branch of the Secret Service to attempt to re-

(continues)

claim his property, he was told that the game was, in the opinion of the agents, a handbook for computer crime. At that point, Jackson thought he knew the reason for the search: the employee designing the product, Loyd Blankenship, had faced a Secret Service raid on March 1 and equipment had been confiscated from his home. But surely this was a misunderstanding: GURPS Cyberpunk involved a science-fiction scenario occurring in the future, and the computer described and the details of its operating system were products of a game designer's imagination.

Nonetheless, Jackson was not able to retrieve his data or equipment then. The best he could do was make an appointment with the Secret Service to make copies of a very few files, with an agent painstakingly hunt-and-pecking the commands at the keyboard, muttering comments, Jackson claims, like "modems should be outlawed." When Jackson's lawyer asked to see a copy of the warrant, the attorney was informed that the information was sealed. It was not until the Electronic Frontier Foundation, a Cambridge, Massachusetts–based nonprofit devoted to protecting civil rights in the computer age, became involved in the case and announced its intent to sue to get the document released that the search warrant was unsealed.

The Real Reason

Once the search warrant was released, Steve Jackson learned that his game had nothing to do with the search. The warrant consisted of a description of the location, a general list of material and equipment to be examined, and an affidavit by Secret Service agent Tim Foley that presented the justification for the search.

The real motive behind the raid was to gather evidence relating to Loyd Blankenship. This young man, according to Foley, was a member of the so-called Legion of Doom, an informal group of cyberpunk hackers who were under scrutiny for allegedly messing with the Bell South telephone system. Blankenship, whose online handle was The Mentor, had a bulletin board of his own and like several other BBS operators across the country had posted an electronic newsletter called *Phrack*. This information was provided to Foley by Henry (Hank) Kluepfel, a Bellcore security expert who logged on to Blankenship's bulletin board, checked the user list, and discovered people known to Kluepfel as hackers. As Foley defines the term, "computer hackers are individuals involved with the unauthorized access of computer systems by various means."

According to Foley's affidavit, *Phrack* was published by a college student named Craig Niedorf. In issue 24 of *Phrack*, Niedorf included a document allegedly stolen from Bell South by a Legion of Doomer named Robert Riggs. (Riggs has since pled

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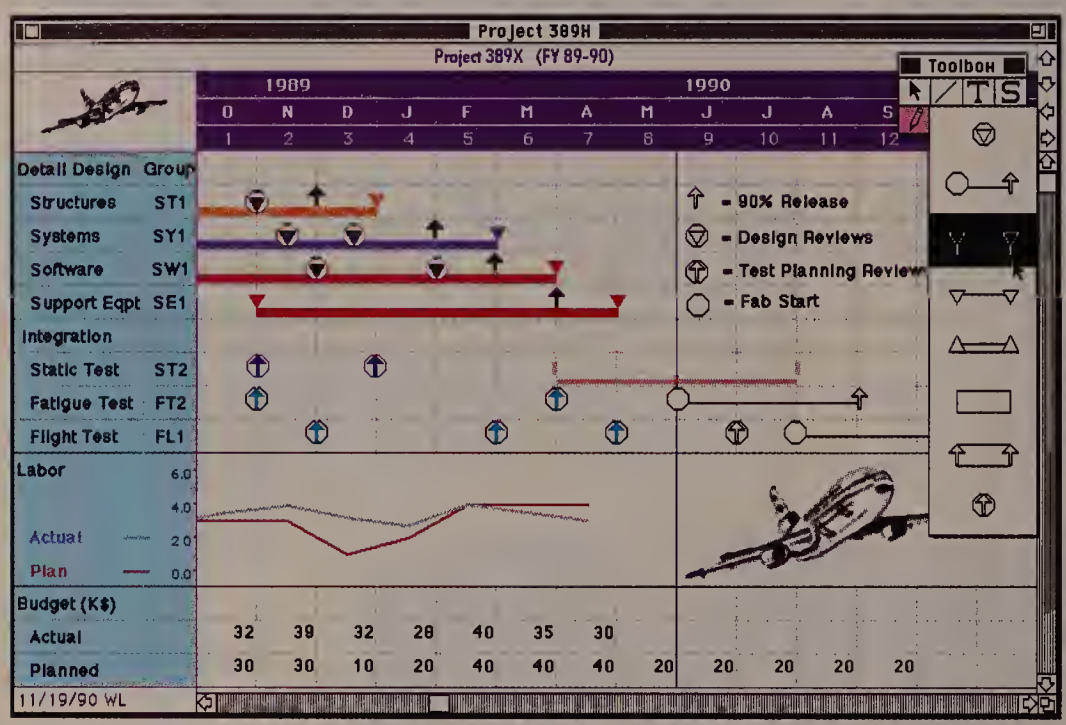

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guilty to the theft.) It concerned the 911 emergency phone system and was, Foley claims, a "highly proprietary" document worth at least $79,000. By republishing the document, Blankenship allegedly violated the law against transporting stolen property worth more than $5000.

The second alleged crime cited was also discovered as a result of Hank Kluepfel's daring undercover work. Supposedly, another hacker involved in running the BBS had begun a new service to crack UNIX passwords. This would be a violation of federal law. Foley claimed that Blankenship was involved in this scheme because Blankenship responded to a question about a certain "transfer protocol," presumably to be used to crack passwords and rummage through people's data.

The Affidavit Decrypted

Sounds frightening. But upon further examination, the charges in the Secret Service affidavit evaporate as cleanly as a deleted data file. First, consider the case against the electronic newsletter *Phrack*. Putting aside the question of whether simply republishing a stolen document is a crime (remember, the Supreme Court affirmed that the *New York Times* was within its rights to print the Pentagon Papers), there is a question of the worth of the 911 document. Indeed, when government attorney William Cook brought *Phrack* publisher Craig Niedorf to trial he got a very nasty surprise. Neidorf's defense team had discovered that the information in the "highly proprietary" paper could easily be found in public libraries and ordered for $13 by calling an 800 number run by the phone company itself. (At that point Cook discreetly dropped the charges against Niedorf.)

As for the password-decryption scheme supposedly uncovered by the Bellcore security expert Henry Kluepfel, it's enlightening to examine the actual comments posted. True, a hacker calling himself Erik Bloodaxe (spare me) discussed such a plan, but it was clearly in the realm of speculation. He even finished his comment by saying, "What do you people think? Bad idea? Good idea? Hell . . . it is just another attempt by me to piss everyone off." This disclaimer was not included in Foley's affidavit.

And Loyd Blankenship's role in this imaginary scheme is even more evanescent. In the course of the online discussion, someone mentioned the word *kermit*. Another user asked what that was, and Blankenship, in his only comment in that particular thread, mentioned, correctly, that it's simply a transfer protocol to move files from one computer to another. There's nothing illegal or sinister about it. So the link to Blankenship in this affidavit was entirely bogus.

So much for the reasons for searching Blankenship. What about Steve Jackson? There were *never* any allegations against him. The search of his company was conducted only be-

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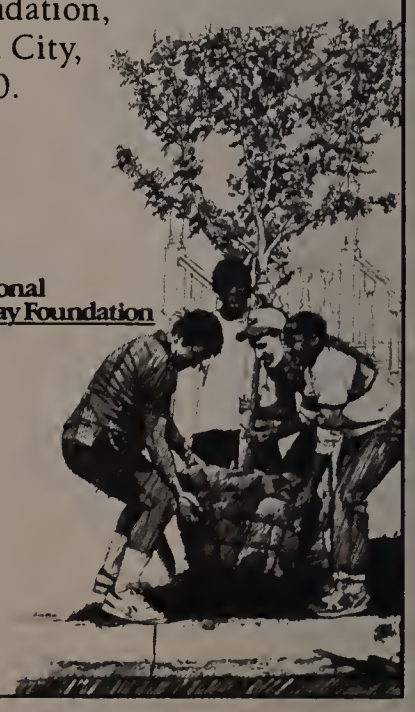

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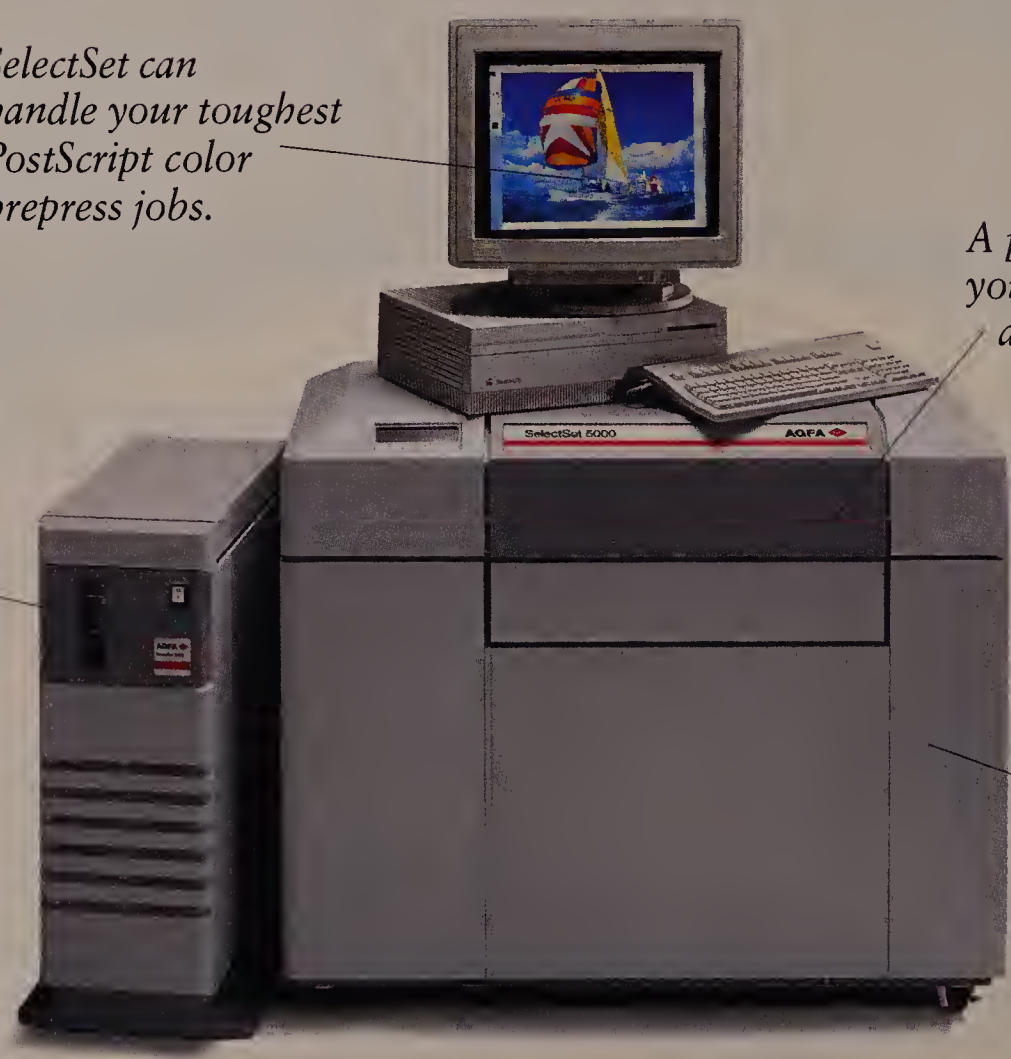

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cause Blankenship worked there. As a result, the company could not continue with a key product, and Jackson, fighting to keep his company going, had to lay off 8 of his 17 employees. "The layoffs were entirely because of the raid," says Jackson. "When we couldn't ship the product, we had no money. It almost killed our company." It wasn't until six months after the search that any of Jackson's equipment was returned. Of the three computers confiscated, one was fine, one didn't work until after a $200 repair job, and the third was inoperable.

Even though Jackson has now published GURPS Cyberpunk, and the game is doing well, the company has not yet recovered. "I know we've lost more than $125,000 because of the raid," says Jackson. "But I can't put a cash value on firing eight employees." He has rehired one worker and plans to add another; that means there are still six people without jobs, courtesy of the United States Secret Service.

The Issues

The Jackson case may not be over. The Electronic Frontier Foundation has retained counsel for Jackson. The foundation has not yet decided if Jackson's experience would make a good test case in a civil action to determine the limits of the government in computer-related searches.

But even if this case never reaches trial, Jackson's attorney, Sharon Beckman, believes that Steve Jackson has been unfairly treated. "This isn't the way things should happen," she says of the search. Some of the issues have nothing to do with the computer age. For instance, the lack of a nexus—a piece of evidence linking Steve Jackson Games to the investigation of Blankenship—is ample grounds for questioning a search, regardless of any computer connection. But more to the point, the entire Jackson case illustrates the lack of established precedent in dealing with crime that may involve electronic data.

Beckman points out that one of the confiscated computers was devoted to running a BBS that was actually connected at the time. Since an electronic bulletin board is a sort of publication (however new), pre-

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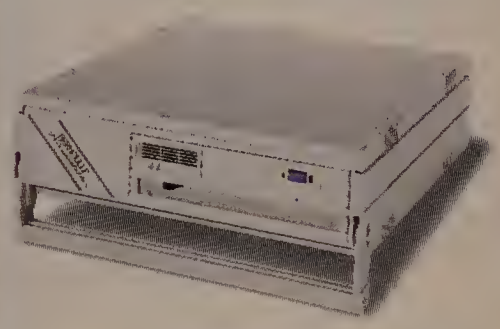

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sumably it is entitled to protection under the First Amendment. A related First Amendment question comes from the fact that Steve Jackson Games is essentially a publisher. Its ability to publish was ended simply because the government thought that one of its employees might be storing incriminating evidence on the company computer system. Does this mean that if a hacker worked for *Macworld,* or the *New York Times,* investigators could use those circumstances to confiscate all the computer systems, effectively shutting down operations?

There are other issues as well. Certainly law enforcement officials should be able to legally search computer files when there is sufficient evidence, fairly presented, to get a search warrant. But how sweeping should the search be? "Does a search mean that every piece of digital media that the subject has should be searched?" asks Marc Rotenberg, of the Computer Professionals for Social Responsibility (CPSR). "The main point of searches of digital spaces should be the concept of minimization, trying to get the least intrusion possible." In an ideally designed search, law enforcement officers might well examine hard drives electronically, seeking key words to identify relevant documents while maintaining the privacy of the remaining files.

Gail Thackeray, an Arizona prosecutor known for her antihacker efforts in what have been called the Sun Devil raids, says that properly planned digital searches can minimize inconvenience to searchees, particularly those involved as witnesses rather than as the subjects of investigation. But she does note that sometimes it's not so easy to determine immediately what might or might not be relevant. And sometimes investigators looking through confiscated data files can stumble on other materials that might trigger further action. "What if we take 10 disks away from someone we suspect of breaking into computers and taking data, and we discover 15 expensive software programs that look like pirate copies. What do we do? Give back stolen property?"

Thackeray says that though it is unlikely, and current law limits this option to federal authorities, it *is* possible that a prosecutor might try the "Al Capone trick." (As mob scholars and movie fans know, Capone was nailed not for murder but for tax evasion.) So if a prosecutor can't pin a break-in on a hacker, he might decide to try him for a pirated copy of SimEarth. Or, as Marc Rotenberg notes, "If you extend the 'plain view' doctrine [which means that anything visible to investigators during a search is fair game] to digital media, there's a problem—*everything* is there. What if you wrote a memo to yourself saying you haven't paid the IRS?"

The Worst Case

Somehow I feel that common sense, spurred by the efforts of organizations like the CPSR and the EFF, will ultimately prevail. Eventually law enforcement officers will understand computers better and learn to search electronic files effectively. If not, judges will force them to.

But what I do not understand is the passion with which certain law enforcement officers pursue groups like the Legion of Doom, who strike me as relatively benign lawbreakers on the overall scale of skulduggery. The murder rate is soaring, the national debt is burdened by savings and loan fraud, and here is the Secret Service, led by government attorneys, expending its limited resources to chase Erik Bloodaxe and The Mentor. In their defense, prosecutors like Gail Thackeray claim that the harm caused by young cyber-criminals is not only considerable, but growing. And though none of the Legion of Doom have been convicted of actually damaging anyone's files, there is a clear potential for harm. As computer users, we have much to fear from the dark-side hacker. A bad-case scenario? Someone's privacy could be violated when a hacker reads computer files without permission. Our files could be compromised or made unavailable. The very worst case? An entire business could be brought to a halt.

In other words, precisely what the Secret Service did to Steve Jackson Games. ■

Steven Levy, a Macworld *columnist, is writing a book on artificial life.*

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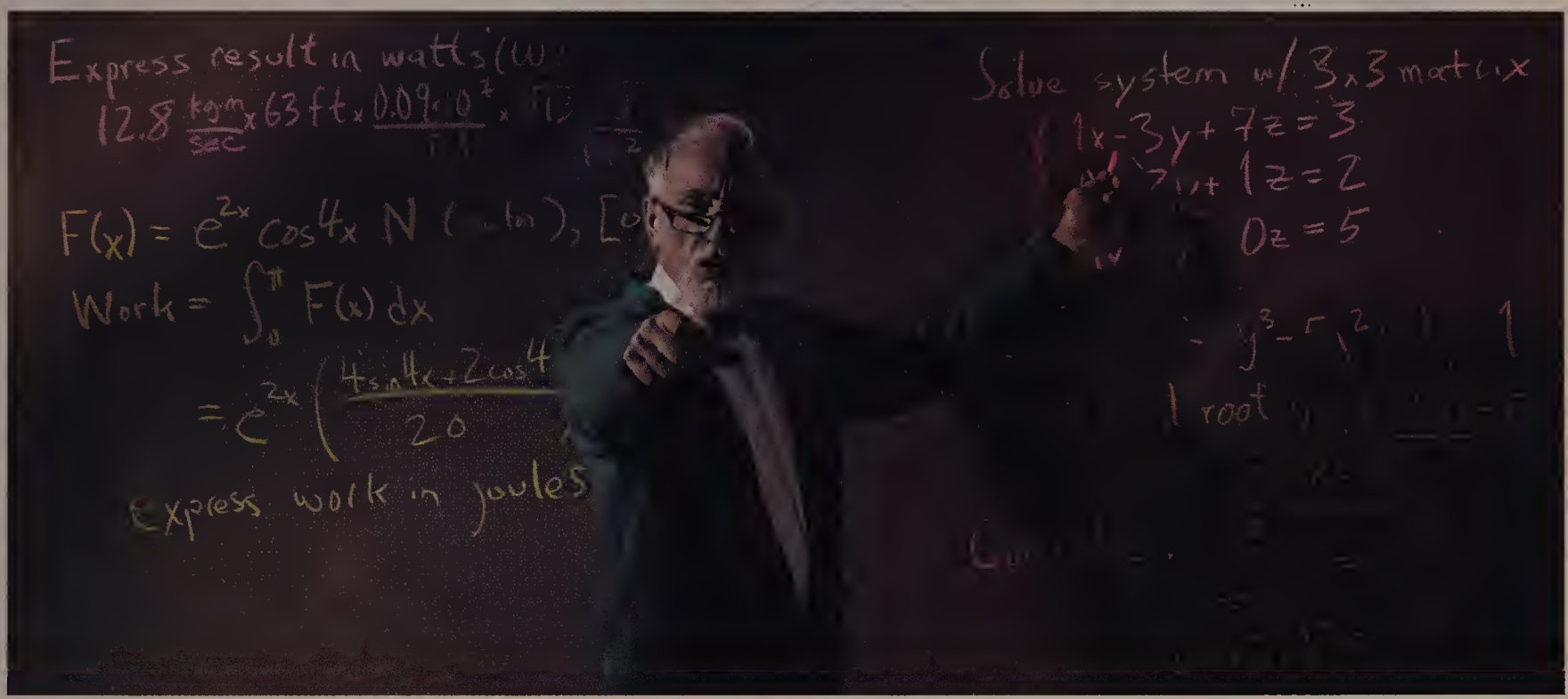

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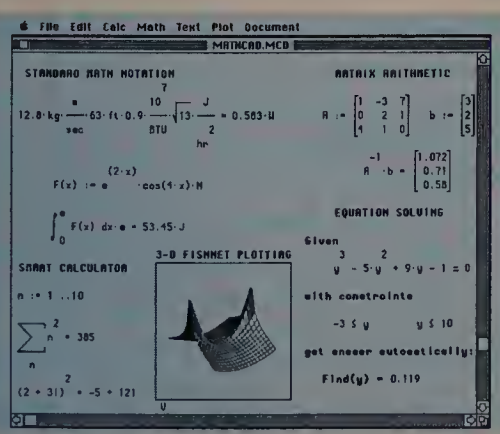

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Ethics, E-Mail, and the Law

When legal ain't necessarily right

BY DEBORAH BRANSCUM

Just over a year ago, Epson America fired Alana Shoars from her job as electronic-mail administrator. Epson says she was fired for just cause, but won't elaborate. Shoars says she was fired for questioning why her supervisor was reading employee E-mail without the knowledge of the employees involved.

The suits Shoars has filed against Epson raise several unresolved legal and ethical questions about electronic communications. Some 10 million people in the United States use E-mail systems, and users tend to assume that electronic messages are as private as letters sent through the postal service—but that's not the case.

The Suit against Epson

Alana Shoars says she found out the hard way as Epson's E-mail administrator. The company "told me to market the E-mail system and make sure everyone knew it was private, safe, and secure." But according to Shoars, E-mail between the Hewlett-Packard 3000 system and the MCI Mail service was being monitored by her supervisor. "I could keep my mouth shut and ignore it, or I could try to stop it and lose my job," said Shoars, who now works for Warner Brothers. "I made my choice. I had given everyone in the company my word that the E-mail was safe and secure."

Epson has a very different perspective. Shoars "was terminated for just cause," says Scot Edwards, Epson's director of corporate communications. "Her termination had nothing to do with electronic mail or the right to privacy."

JENNIFER CHEUNG

Alana Shoars says her supervisor was reading her E-mail. Now she's suing Epson America for invasion of privacy.

Epson denies allegations that the company was monitoring electronic mail and denies any wrongdoing. "The E-mail system is part of the computer system that also carries other non-E-mail company data," says Edwards. "And because there are individuals charged with maintaining and administrating the system, we do not guarantee the privacy of electronic data on our system. But our policy clearly is not to routinely or indiscriminately read electronic mail." But attorney Noel Shipman, who represents Shoars, maintains that Epson was reading and printing out E-mail and in so doing violated a California law that makes it a crime for a person or company to eavesdrop or record confidential communication without the consent of both the sender and receiver. (Colorado and Florida have similar legislation, according to Shipman, who says federal law is weaker because it requires consent from only one party to monitor mail.)

The expectation of privacy is a key issue, according to Shipman. At the time Alana Shoars was fired Epson (like many companies) had no official policy regarding access to E-mail. "Privacy is a constitutional right in California," says Shipman. "There are all sorts of very easy ways to invade your privacy. But the law says you have a right to your privacy. And you have a right to communicate without unknown parties reading your mail. And the fact that you're doing it at work doesn't change that."

Since Shoars filed wrongful-termination and class-action suits

(continues)

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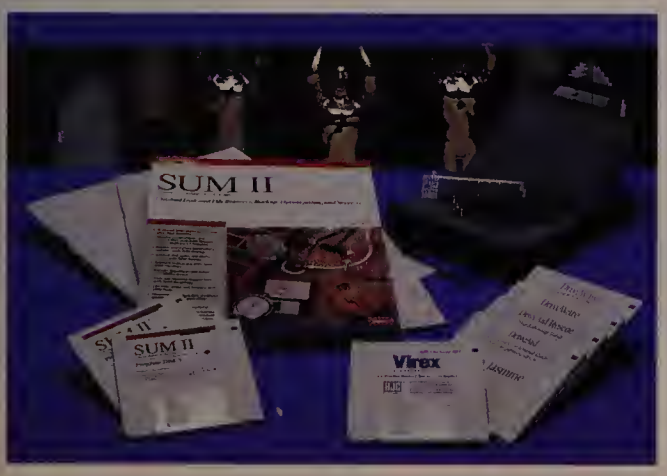

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Circle 126 on reader service card

against the company, Epson has notified employees that it cannot guarantee the privacy of *any* data. To head off lawsuits, some other companies are doing the same. But that may not resolve all the legal issues. Michael Blum, a specialist in electronic communications issues, raises some interesting questions. "In the absence of an employee having reasonable expectations of privacy in the system, should that employee be punished for using cryptographic software himself? And if employees are encrypting information, to what degree should employers have the keys?"

The legal issues won't be resolved anytime soon, which leaves companies to grapple with the practical and ethical considerations of handling electronic mail. Executives routinely give assistants passwords to E-mail accounts so that important messages don't get ignored when they travel or call in sick. And that seems entirely reasonable to me. But reading individual messages for any other reason is the kind of ham-handed action that can destroy whatever trust exists between supervisors and their employees. Moreover, companies don't need to read mail or eavesdrop on telephone conversations to protect their resources. Managers often monitor phone bills to check for inappropriate usage, and the same technique works for electronic mail. As Blum told *InfoWorld,* "You can look at the address, the header, the location from which it is being sent, and how large a file it is in order to determine if the company's resources are being abused." Finally, it's inefficient. E-mail is often less expensive than phone calls or faxes, but once the expectation of privacy is lost, employee usage may drop dramatically.

Whatever official policy a company adopts on electronic mail, there are plenty of ways for a network administrator (or a savvy tech type) to intercept messages—not necessarily to eavesdrop, but to anticipate or solve network problems. "Any product that captures [data] packets directly off the network wire in raw form will bypass most network security," says Eric Forste of Neon Software, which makes a network administration tool for Ethernet networks. There are several similar programs for Ethernet networks, and such products are expected to move to LocalTalk networks soon. Using these tools, virtually anything on a network can be captured and read.

"There's a small universe of people who know how to intercept electronic mail and an even smaller subset who want to," says Mike Godwin of the Electronic Frontier Foundation. Maybe so, but can managers really feel comfortable knowing that their confidential memos can be captured? "The only protection you have is encryption," says Forste. Some companies, such as cc:mail, already offer encryption as part of their Macintosh E-mail products. Others, such as Microsoft and CE Software, are working to add that feature so that messages will be

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automatically encrypted once they are composed and decrypted at the receiving end.

Until mail encryption becomes universal, Alana Shoars has some advice. The first suggestion: get the company policy on E-mail in writing. The second "goes back to an old rule my grandfather taught me. Don't put anything in writing that you would be ashamed to see on the front page."

The Prodigy Puzzle

The privacy of electronic mail on information services is protected by the Electronic Communications Act of 1986, but revised message guidelines and a new membership agreement by Prodigy suggest that privacy is not the only issue when it comes to electronic communications.

As readers of *The Iconoclast* (January 1991) may recall, after the Prodigy information service announced a new fee structure for electronic mail last year, all hell broke loose. A group of protesters organized to oppose the price hike and sent out thousands of messages to other members and advertisers to win support for their cause. Prodigy responded by abruptly disconnecting about a dozen people because of complaints the company says it received. The service also instituted new guidelines for private mail and revised the membership agreement.

Prodigy's messaging guidelines place limits on communications to advertisers, the use of messaging software with the service, and so-called chain letters. According to the guidelines, "Members may use messaging to contact merchants and advertisers only to purchase goods and services [and] communicate about specific orders placed online. Automated message-distribution programs . . . may not be used with the Prodigy software. Chain letters (a mailing with a request to recipients to continue distribution to others) are not permitted."

Prodigy wants to make it clear that it is not an E-mail service. "This was costing us an enormous amount of money, thousands of dollars," says Geoffrey Moore, the director of market programs and communications at Prodigy. "What we didn't anticipate and what we can't ignore is having a tiny minority send out huge amounts of mail. Even if they pay for it, if the volume is unlimited we have to make more capital investments—add more modems, ports, mainframes. The revenue we get doesn't come anywhere near covering those capital expenses."

I called Moore because I was troubled by what Henry Niman had told me about his experience with Prodigy. Niman, a cancer researcher in Pittsburgh, Pennsylvania, was involved in the Prodigy E-mail protest and sent out hundreds of messages about the price hike and related developments. Niman says that his account, like those of several other protesters, was terminated without warning for "harassing" other members, a charge he denies.

(continues)

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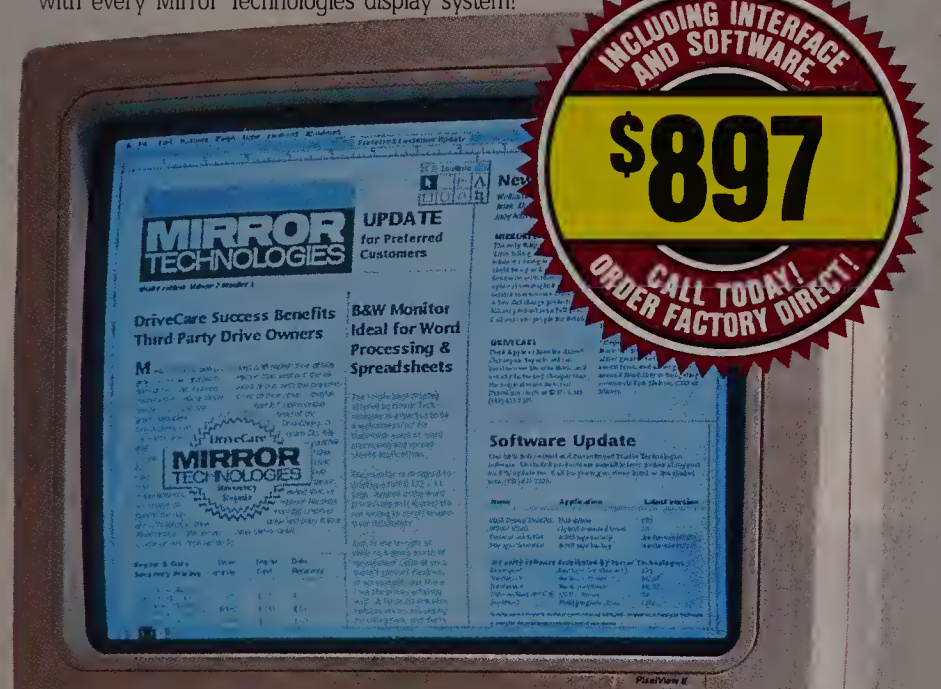

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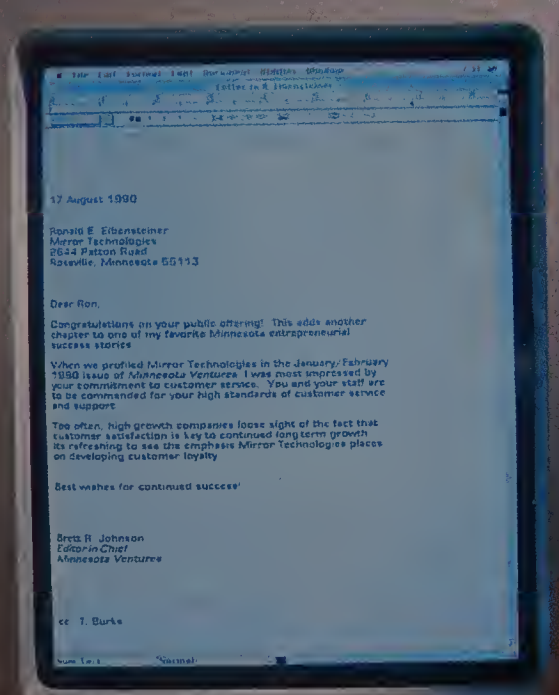

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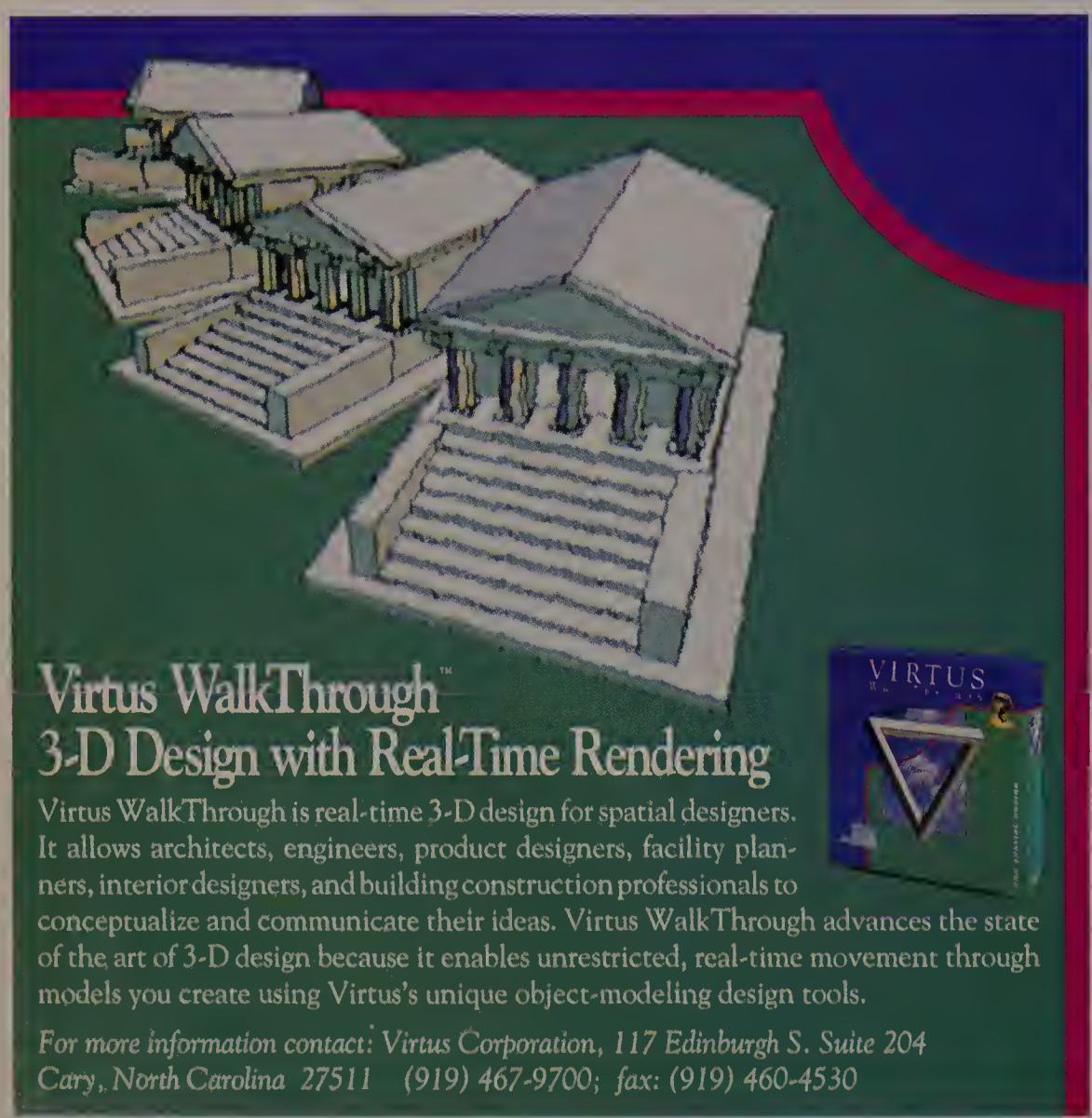

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HARRY EDELMAN

Henry Niman lost his Prodigy account.

Niman lost access to electronic banking and, like the other protesters, he lost access to the messages in his mailbox. In his case, that was particularly critical because one of the messages involved a patient's medical treatment.

Prodigy's membership agreement says that either side can terminate without warning. Prodigy will not discuss individual members, but Moore said, "I don't think we specifically went to them and said if you don't stop what you're doing, we're going to disconnect you." The company has offered to allow the protesters back onto the service if they sign the revised guidelines. But Moore didn't sound contrite about shutting people out of their mailboxes. "We're not talking about a bunch of people who've done nothing and one day a malicious company cut them off," he said. "We're talking about many people who've done outrageous acts for which many people have complained. . . . We do give them warnings. But if someone is sending 50,000 messages a day, then we don't give them much warning. I don't think you appreciate how much this is costing us."

I appreciate the fact that E-Mail has been more expensive than Prodigy expected, which is why the company changed the pricing structure. But this issue is about more than dollars and cents. Dissent may be outrageous, but it's not a crime. No warning, electronic or otherwise, was sent to the protesters in the many weeks they were sending out mail—they were simply booted off the service abruptly.

Unfair Treatment

Prodigy makes me cranky because I don't think people deserve such

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Sure, we'd heard about virus protection. But it was hard to believe our innocent little Mac could be a breeding ground for computer disease and disaster. Until we started sharing more data disks. And spending more time online. Suddenly it really made sense to protect ourselves.

So we decided to play it safe.
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"faster and easier to use . . ."
—MacWEEK, July 10, 1990

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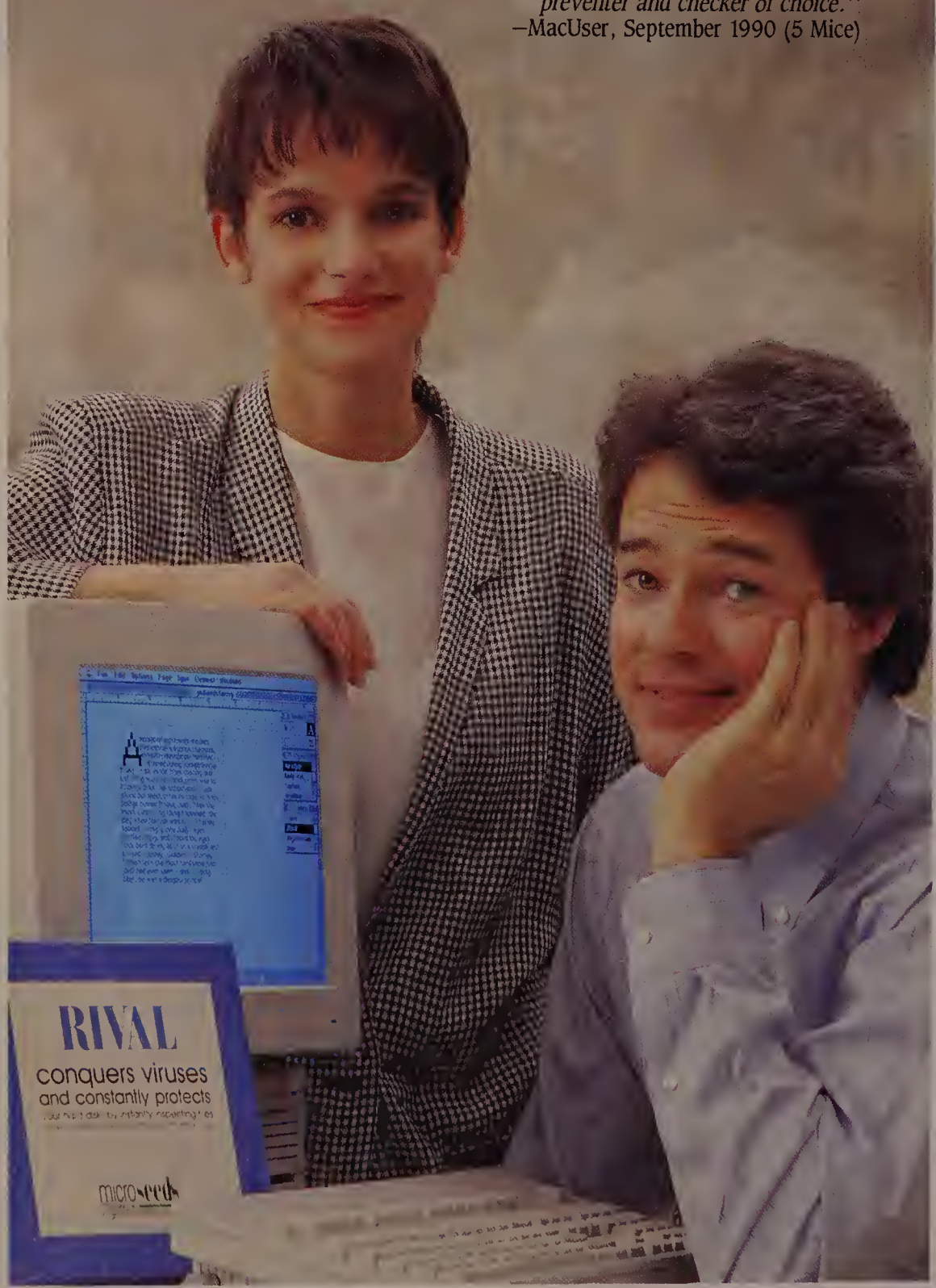

Circle 228 on reader service card.

SERVICE HERO

Manhattan-based consultant (and *Macworld* contributing editor) David Pogue writes of a satisfying experience with Texas Instruments. He suggested that one client buy a Texas Instruments microLaser printer. After a few days, the printer stopped working. Pogue called the service number and discovered that there was a TI repair place only a few blocks away. But the client had lost the receipt.

"The TI guy asked where we bought it. We told him MacAvenue. He told us to hold on. Within five minutes, he was back to us. He had traced the most recent shipments of microLasers from the TI plant to MacAvenue. It had been manufactured only a month before, and thus was certainly within its warranty.

"The final good straw: over the phone, we deduced that the problem was with the controller board. No need to haul in the whole 35-pound printer, he said."

treatment unless they are being investigated for a criminal act. And I don't approve of limits on private communications to advertisers—what if I have a customer service complaint?

Niman and others complained to Prodigy about the lack of notice and other aspects of their membership terminations. Perhaps in response, the company has expanded its membership agreement to make it clear it has no responsibilities to speak of toward its members. "Prodigy may terminate any Membership without notice for violation of this Agreement or for other conduct that Prodigy believes, at its sole discretion, is detrimental to other Members or to the business interests of Prodigy, its Merchants or information providers," reads the agreement. Prodigy has no responsi-

(continues)

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Publications ..... 31.
Holidays ..... 31.
Christian Images ..... 38.

Dubl-Click
Wet Paint 1-18 ..... ea 39.
World Class Fonts 1-8 ..... ea 39.

Tactic Software
ArtClip 1st Ed ..... 49.
ArtClip 2nd Ed ..... 64.
ArtFonts Pak ..... 49.

Word Processing

A Lasting Impression
RésumExpert ..... 48.
Cover Letters ..... 48.

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OmniPage 2.1 ..... 538.
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Deneba Software
BigThesaurus ..... 63.
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Comment 2.0 ..... 63.

Lexpertise U.S.A. Inc.
MacProof 3.2.1 ..... 115.

Lifetree
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Microsoft
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Paragon Concepts, Inc
Nisus 3.0 ..... 238.

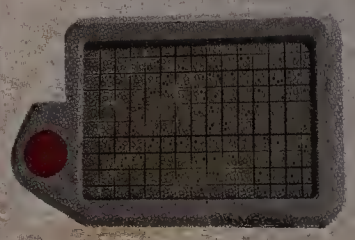
Personal Bibliographic
ProCite ..... 195.

Preferred Publishers
Vantage 1.5 ..... 51.

SNA
Stylist ..... 45.

T/Maker
WriteNow 2.2 ..... 116.

Wordperfect Corporation
Wordperfect 1.0.4 ..... 228.



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Type Reunion ..... 37.
Type Align ..... 58.

Aldus/Silicon Beach
Design Team ..... 888.
(Incl. Freehand, Pagemaker and Aldus Pre-Print)
Digital Darkroom 2.0 ..... 247.
Freehand 2.02 ..... 328.
PageMaker 4.0 ..... 498.
Aldus Pre-Print ..... 328.
Super 3D 2.1 ..... 338.
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Altsys
Art Importer 2.0 ..... 88.
FONTastic Plus ..... 50.
Fontographer 3.1 ..... 248.

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Print Shop ..... 34.
TypeStyler 1.01 ..... 114.
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Amazing Paint ..... 64.

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Deneba Software
Canvas 2.1 ..... 188.
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Design Science, Inc.
Math Type ..... 88.
Para Font ..... 58.

Dynaware
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Electronic Arts
Studio 1 ..... 55.
Studio 8 2.0 ..... 185.
Studio 32 ..... 448.

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Comic Strip Factory ..... 36.
#1 Office Days ..... 20.
#2 Kid Stuff ..... 20.

Frame Technology
Frame Maker ..... 795.

Koala Technologies
Mac Vision ..... 258.

Letraset
ColorStudio ..... 648.
DesignStudio ..... 494.
FontStudio ..... 368.
ImageStudio ..... 138.
LetraStudio ..... 274.
ReadySetGo! 4.5 ..... 164.

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ModelShop ..... 374.
Swivel Art ..... 81.
Swivel 3D 1.1 ..... 294.
Swivel 3D Professional ..... 438.

Preferred Publishers
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Master Color ..... 102.
Master Paint ..... 50.

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XPress 3.0 ..... 508.

Salient
Partner 1.01 ..... 55.

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Curator ..... 75.
SmartScrap & Clipper ..... 55.

SuperMac Technology
PixelPaint 2.0 ..... 224.
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Softview
if:X Forms Designer ..... 168.

Tactic Software
FontShare ..... 138.
Icon-It ..... 44.

Timeworks
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DeskPaint/DeskDraw 3.0 ... 114.

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Virtual - Mac II w/PMMU ... 187.
Virtual - SE/30, IIx, IIcx ..... 114.

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Sony Disks
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Bulk DS/DD (50 pk) ..... 39.
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InterFax 24/96-220V ..... 417.

Applied Engineering
DataLink Express -
MNP 5 ..... 195.
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DataLink Mac II -
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DataLink Mac Portable -
MNP 5 w/Send FAX ..... 275.

CompuServe
Membership Kit ..... 22.

CompuServe
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Everex
EMAC MD2400 MNP 5 ..... 175.

FreeSoft
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White Knight 11 ..... 84.

Global Village
Teleport ADB ..... 128.
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Smartcom II 3.1 ..... 84.

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Orchid Technology
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Prometheus
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Macknowledge ..... 84.
MaxFax 24/96 ..... 308.

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Travel Modem - Port. ..... 204.

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Versa Term 4.1 ..... 87.
Versa Term Pro 3.0 ..... 173.

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TGS Systems
Prograph w/ Compiler 2.0 . 244.

True BASIC, Inc.
True BASIC Language 2.02 .. 54.

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ZBasic ..... 98.

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Addison Wesley
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Hyperpress Publishing
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- Hyper TMON 2.8.4 ..... 57.

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- Power Macros - Hypercard . 34.

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- Materials CD ROM ..... 124.

Microsoft
- Office CD ROM ..... 598.

Softstream International INC
- Hyper Hit I ..... 118.
- Hyper Hit II Relational ..... 268.

Silicon Beach Software
- Super Card 1.5 ..... 198.

Wayzata Technologies
- Quickart ..... 174.
- Seals in the US Gov't ..... 49.
- All of Mac Tutor ..... 160.
- Disc Tracy ..... 75.
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- Gator Share Software .... 1,350.
- Gator Card E/II ..... ea. 458.
- Gator Mail Q or M 10 user 675.

CE Software
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- In/Out (1-10 user) ..... 186.
- QuickMail 2.2
  - 1-5 users ..... 207.
  - 1-10 users ..... 307.
  - 1-50 users ..... 1,567.

DataViz
- MacLink Translators ..... 97.

DataClub
- 3 users ..... 198.
- 10 users ..... 538.

Dayna Communications
- EtherPrint ..... 350.
- DaynaPort E/SE,II & 030 .. 355.
- DaynaNET/4L ..... 565.
- Speed guard collision filter . 52.
- DaynaTalk for Macintosh
  - Single ..... 95.
  - 5 Pack ..... 380.
  - 10 Pack ..... 715.

DayStar Digital
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  - LT 200 PC ..... 185.

Dove
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Farallon
- *LocalTalk -*
  - PhoneNET DIN-8 ..... 30.
  - PhoneNET DIN-8 (10 Pk) . 195.
  - PhoneNET DB-9 ..... 30.
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  - Star Connector (10 Pk) .... 125.
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- MacDraw II ..... 288.

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- CADD for the Macintosh .. 374.
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- Vellum ..... 684.

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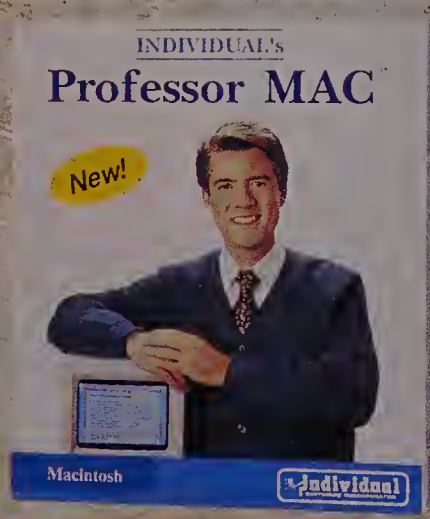
- Blueprint 2.0 ..... Call.
- MiniCad+ 3.0 ..... 585.

Innovative Data Design
- Dreams ..... 318.
- Mac Draft 2.0 ..... 192.

Softstream International
- Relational Objects ..... 148.



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- Computer Eyes-B/W ..... 194.

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- Voice Digitizer ..... 109.

MacroMind
- MacroMind Accelerator .... 124.
- MacroMind Director 2.0 ... 437.
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- OMI Convertor ..... 615.

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Accessories

Avery Labels
- Mac Label Pro ..... 48.

Casio
- Casio B.O.S.S. ..... 219.
- CasioLink/Mac ..... 98.

CoStar
- LabelWriter ..... 184.
- Organizer ..... 195.
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I/O Designs
- *Carrying Cases - Blue or Black*
  - Imagewriter II. ..... 48.
  - MacLuggage Classic/SE ..... 64.
  - MacLuggage II/IIfx ..... 98.
  - MacLuggage IIcx-ci-si ..... 84.
  - Ultimate Classic Case ..... 84.
  - The Ultimate SE ..... 78.
  - Ultimate Neon Carrying Case Green - Pink - Yellow ..... 88.

Kensington Microware
- Dust Cover SE XKB ..... 9.

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- Dust Cover SE. ..... 9.
- ImageWriter II Cover ..... 8.
- Anti-glare Filter ..... 32.
- SE Rad./Anti-Glare Filter .... 51.
- Anti-glare Filter 13" Apple ... 63.
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- Universal Printer Stand ..... 15.
- Mac II Stand w/o cable ..... 19.
- Mac IIcx Monitor Stand ..... 54.
- Mac II Monitor Stand ..... 64.
- Mac II Mon. Cable Ext. Kit ... 32.
- Masterpiece Mac II ..... 105.
- Extended ADB Cable ..... 24.
- Universal Copy Stand ..... 22.
- Printer Muffler 80 ..... 43.
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- LaserWriter II Security Kit .. 32.

Kensington Microware
- A-B Box (DIN-8) ..... 63.
- SuperBase ..... 31.
- PowerBacker 360 ..... 269.
- PowerBacker 450 ..... 337.
- PowerBacker 520 ..... 397.
- PowerBacker 800 ..... 746.
- PowerBacker 1200 ..... 946.
- Pass Proof ..... 70.
- SideClip ..... 6.

Mac Packs - Linebacker
- *Navy, Wine or Gray*
  - ImageWriter Bag ..... 45.
  - Mac Plus/SE Bag ..... 55.
  - Mac SE Bag Xt ..... 69.

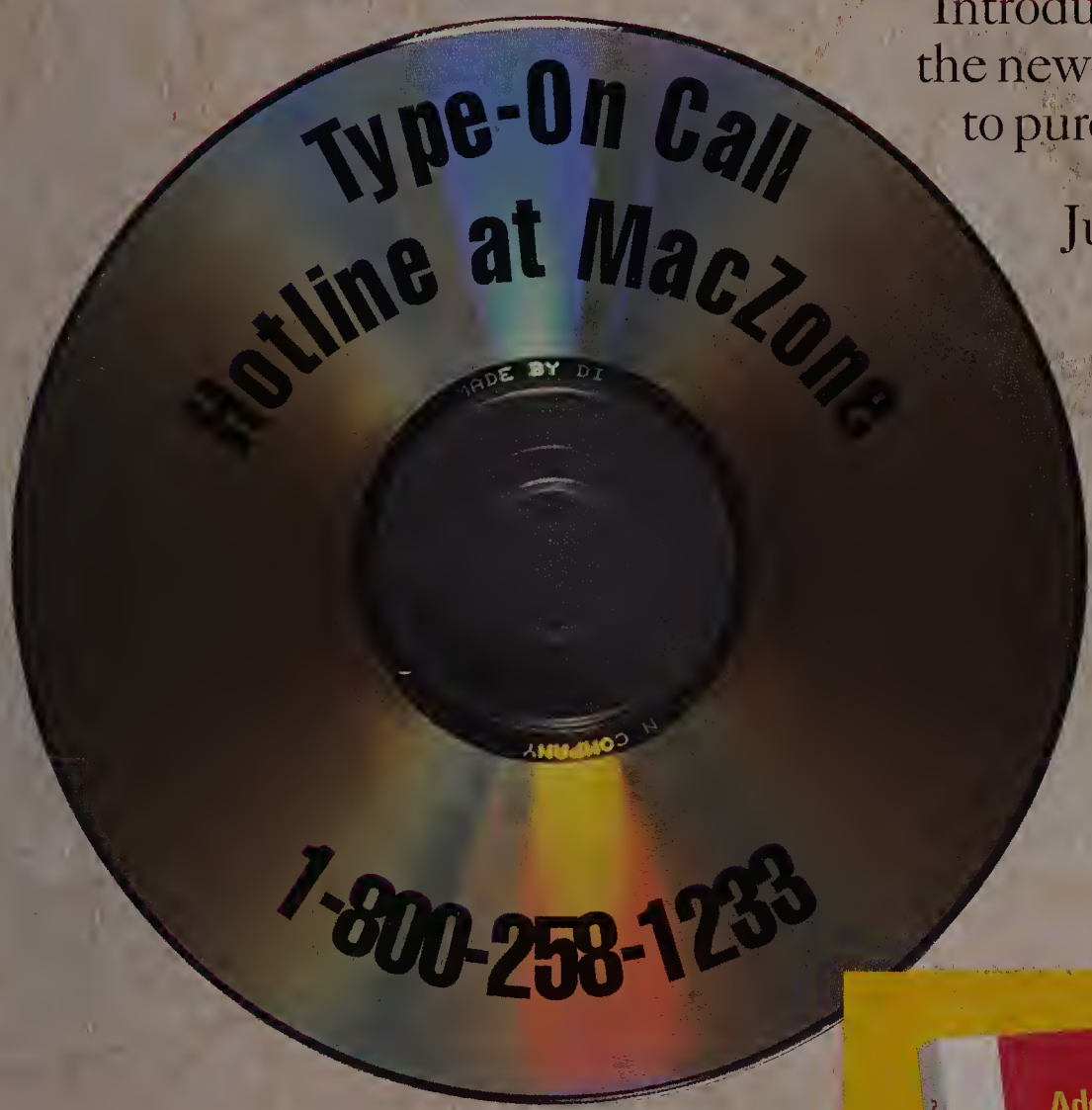
Smack-a-Mac
- Smack-a-Mac Stuffed Mac ... 8.
- *Covers*
  - SE/Plus w/ext. keyboard .... 17.
  - SE/Plus w/std. keyboard .... 17.
  - Apple 13" monitor & ext. keyboard ..... 18.

Shiva Corp. NetModem V.32

The NetModem V.32 is a 9600 bps modem that is designed to be shared over AppleTalk. The NetModem also includes Dial-In Network access software which allows a remote Mac or PC to dial into the network and use electronic mail, printers and other network resources.

NetModem V.32 ..... $1165

Technological Breakthrough Demands Precision Service



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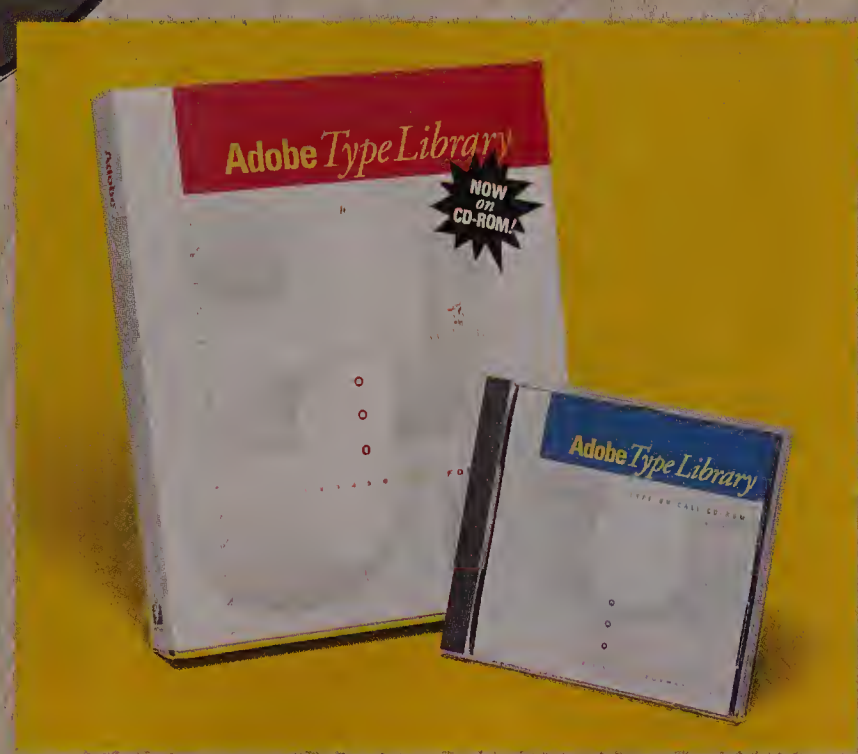

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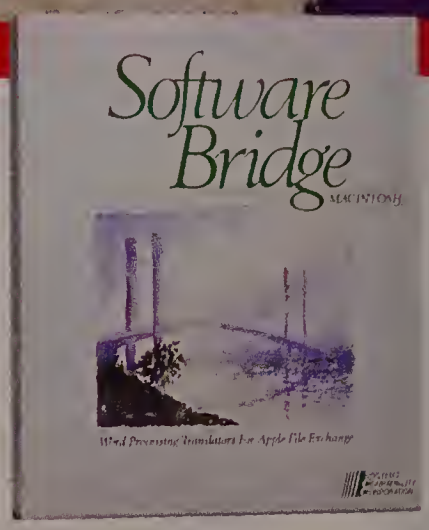

System's Compatability Software Bridge

Software Bridge's award winning word processing file conversions are now available for the Macintosh. Conveniently operates under Apple File Exchange and retains formatting as you convert 24 popular word processing programs: Microsoft Word, MacWrite II, WordPerfect, Miocrosoft RTF, ASCII and DCA/RFT.

Software Bridge $78

ACIUS File Force

Create files for customers and parts in seconds – then build a relational file manager simply by linking the files together. Create in invoice that automatically looks up customers, enters each line items into its won file, and computes extended price, tax and total for you. Print form, summary reports, mailing label, mail-merge letters, and graphs using information from any files. File Force combines the simplicity of file managers with the power of relational databases.

File Force $244

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Dynaware DynaPerspective

DynaPerspective is a three-dimensional modeling and design presentation program that can stand alone or enhance other CAD systems with its innovations and unique features. Highly flexible geometric primitives allow rapid creation of designs, assigning such attributes as color, transparency, line type, border display, etc., which can be edited at any stage of the construction. Automatic or step-by-step walk through presentations are easily created.

DynaPerspective $635

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Full Page Scanner ..... 755.

Thunderware
Lightning Scan 400 ..... 384.
ThunderScan Plus ..... 198.

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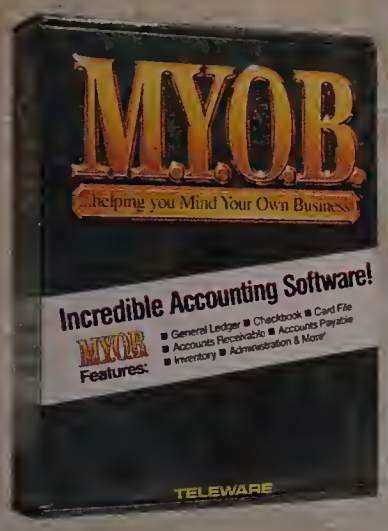
Microsoft Excel 2.2

Microsoft Excel 2.2 delivers a host of improvements and new features. It recalculates up to 40% faster and the new Search and Replace function makes global changes. Charting is improved – just double-click anywhere on a chart to see the dialog box for all the chart formatting commands.

Excel 2.2 ..... $238

Software to manage your money



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M.Y.O.B. 2.0

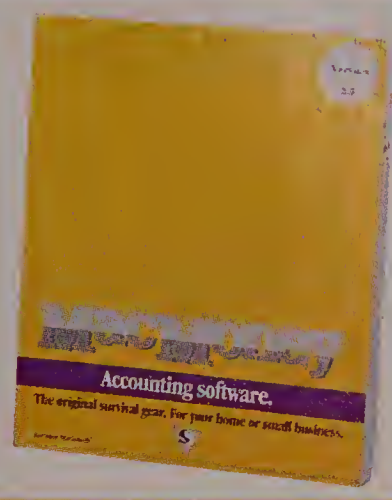
Incredible accounting software for small and medium size businesses. "Best business deal on the Mac" – MacUser – Eddy Awards. Fully integrated G/L, checkbook, A/R, A/P, Inventory, and Card File. M.Y.O.B. combines a powerful fully integrated accounting program with management tools you can't find anywhere else. With just a few clicks, you can control every facet of your business ... print your financial reports, reconcile your checkbook, even call your customers, all with M.Y.O.B.

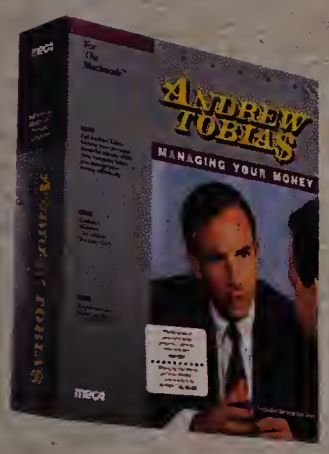
M.Y.O.B. 2.0 ..... $144

Survivor Software
MacMoney

MacMoney – an award winning personal and small business basic accounting program. More than just check writing, it tracks multiple bank accounts, credit cards, and cash accounts, as well as assets and liabilities. Prints reports, graphs and checks and it's easy to use. Complete double entry accounting without having to understand accounting terms. Includes simple loan and retirement planning.

MacMoney $58

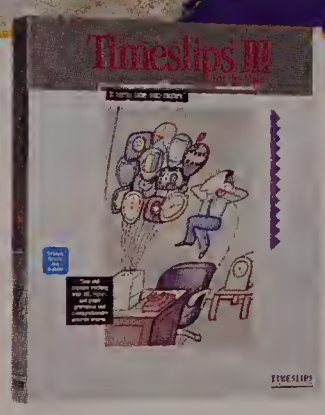




Meca Software, Inc.
Managing Your Money

Andrew Tobias' Managing Your Money is personal financial software that in includes powerful financial "chapters" that provide everything from basic budget and checkbook management to life insurance and tax planning, even complex portfolio management. These integrated chapters allow transactions made in one part of the program to be automatically recorded in the other chapters.

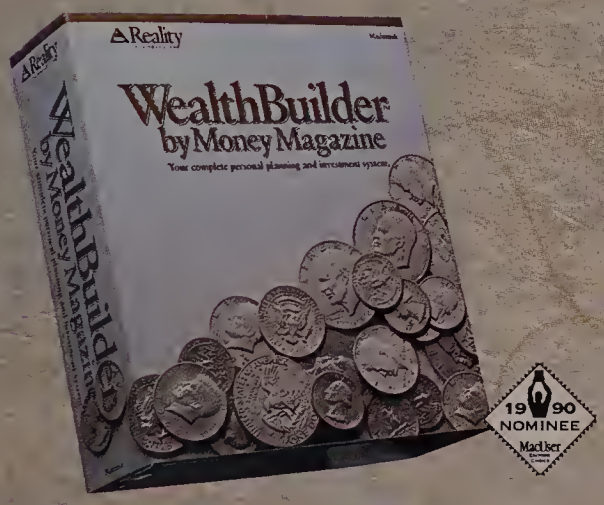
Managing Your Money $230



TimeSlips III 2.0

Timeslips III for the Mac is the ultimate time tracking and billing software system. With it you'll find that your workday is being spent more productively, and that your billings are much more complete. The features and functions are so simple, they practically run themselves.

Time Slips III $167



Reality Technologies Wealth Builder

Calculate your net worth by using templates to easily create a personal profile, balance sheet and budget summary. If you use Quicken, Andrew Tobias" Managing Your Money or Mac Money you can import data directly. Also establish realistic financial goals, objectives and then take action!

Wealth Builder $144

Chipsoft
TurboTax

TurboTax Personal/1040 takes the hard work out of preparing your federal taxes. When finished, it prints out your completed tax form and all supplemental schedules. TurboTax warns you of questionable deductions and tells you what the IRS regards as normal.

TurboTax ... $54

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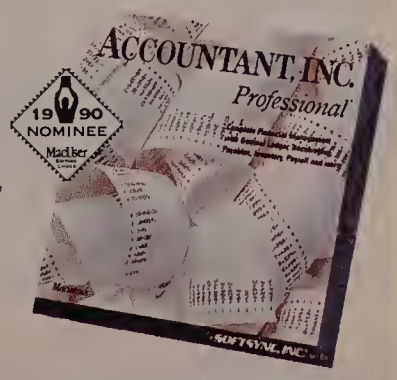
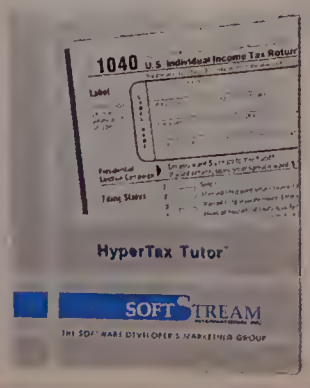
Softsync Accountant Inc.

Accountant, Inc. is a business accounting package that integrates General Ledger, Accounts, Payable, Accounts Receivable, Inventory, Payroll, Job Costing, Project Management and complete financial analysis. Businesses can tract an unlimited number of customers, vendors, inventory items and General Ledger accounts. The program creates invoices, purchase orders, statements, credit memos and job quotes.

Accountant Inc., ... $345





SoftStream HyperTax Tutor

HyperTax Tutor navigates quickly to answer tax questions while teaching the fundamentals of tax-saving strategies. Kamensky's clean and concise style shows you how to plan your finances through the year with over 100 examples. HyperTax Tutor will help you learn how to make the tax laws work to your advantage.

HyperTax Tutor $61

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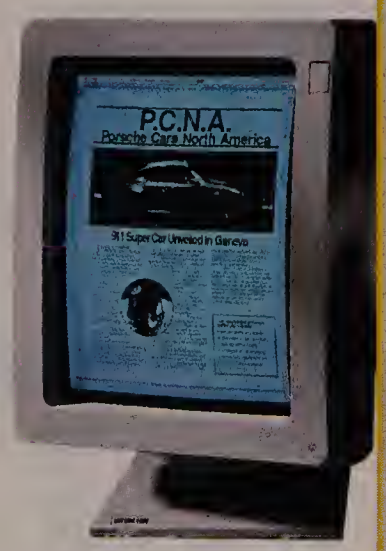
Cutting Edge 15" Full Page Monitor



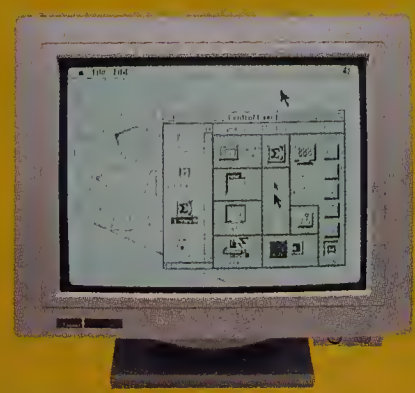
You can now eliminate all the scrolling, scrunching and squinting of small screen Macintosh computing. Word processing, financial analysis and graphics have never looked as good as they do on this full screen viewing area. The monitor can display an entire 8-1/2 x 11 inches of screen with a flicker-free refresh rate of 75 Hertz and a high resolution of 640 by 870 pixels

15" Monitor $579

E-Machine T-16 Color Display

Spread out with almost twice the display area of the standard 13" color monitor. View your work exactly as it will be printed at actual size - 72 dpi. Save almost one half the cost of a 19" color monitor. Get the sharpest, clearest color display at any price. The T16 has excellent colors, linearity, and sharpness, and it sells for a lot less than its larger cousins. The T16 is an excellent choice for CAD/CAM or color graphics. **Retail $2995.**

T16 Color Monitor $2275



Sigma L-View Multi-Mode Monitor

An ergonomic monitor design offers user-oriented details like a tilt/swivel base and paper white phosphor. L-View's Low-Emission design meets guidelines for electromagnetic field emissions established by the Swedish National Board for Measurement and Testing. L-View includes video card, 19" monitor, control panel software, and user's guide.

Multi-Mode Monitor $1475

MegaGraphics Rival B & W Monitor

The critically acclaimed MegaGraphics Rival is now available for all Macintosh models. It gives you the most crisp, most clear, and brightest image in the business, with true "What You See Is What You Get." Because the 19" screen displays two facing pages, it is ideal for use in desktop publishing, layout and word processing. The wide expanse of workspace is an enormous benefit when using CAD and spread sheet applications.

Rival 2001 ..... $1199

Video Boards & Monitors

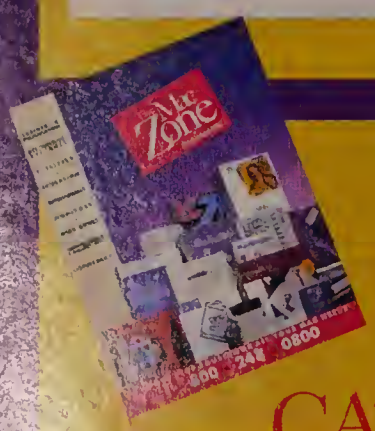
Micron - 8 Bit Color Cards
Resolution 640 x 480
Mac II or SE/30 ..... 345.
Resolution 1024 x 768
Mac II or SE/30 ..... 585.

RasterOps
ClearVue/GS Gray Scale
System Mac II & SE/30 .. 1692.
ColorBoards
208 (II, IIx, IIcx, IIci) ..... 290.
264 (SE/30 - 13") ..... 525.
264 (Mac II - 13") 435
364 (Mac II - 13") ..... 955.

RasterOps
Multi Media
364 w/AudioMedia ..... 1525.
364 w/Director ..... 1295.

Sigma Designs
L-View Multi Mode
SE/30 or Mac II ..... 1475.
Page View
SE, SE/30 or MacII ..... 850.
Silver View for Mac II ..... 1850.
Color Max 24 ..... 4350.

Sony - Color Multiscan
14" 1304 HG Color ..... 825.



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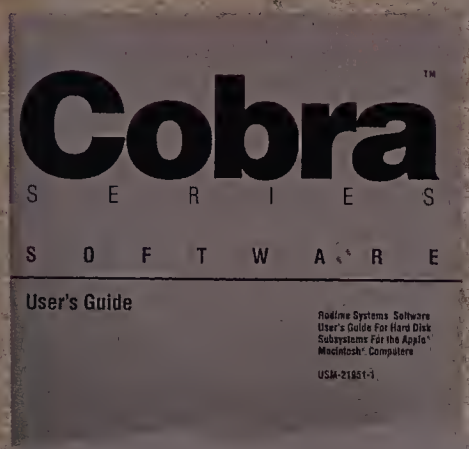


Rodime 210Mb Cobra External Hard Drive

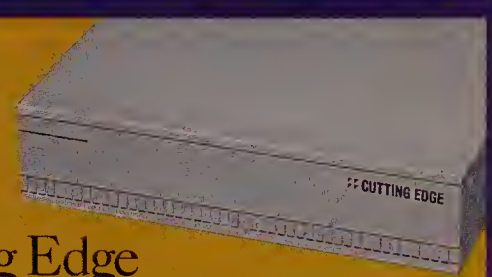
Cobra Drives set the standard. Cobra high performance internal and external hard drives are the finest drives available for Mac. With capacities of 45MB, 70MB, 100MB, and 210 MB, Cobra is the answer to all your storage needs. External Cobra drives come in a new,sleek low profile cabinet that fits neatly beneath your Mac Plus, Mac SE or Mac SE/30. Internal Cobra drives come with three mounting brackets. One for installation in the MacII, Mac IIx, Mac SE or MacSE/30, one for mounting in the Mac IIcx and one for a MacSE which allows you to keep both floppy ports active.

210Mb Cobra External $1475

PLI Infinity 40 Turbo Removable Hard Drive

The Infinity 40 Turbo uses PLI's turbocharged driver software to attain a 20ms access time, and with the TurboCache disk accelerator software and TurboBoost, you can achieve near zero effective average access times. This removable 45MB drive gives you infinite storage potential with removable cartridges. Each one holds 44MB and costs only slightly more per megabyte than floppy disks.

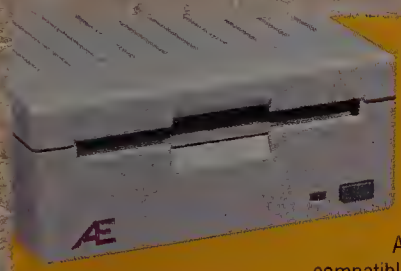
40 Turbo Removable $750



Cutting Edge 20 Mb Drive

Cutting Edge hard drives represent the best value in Macintosh storage. Major enhancements include quieter fan, two power outlets and added surge protection.

20 Mb Drive $299



Applied Engineering 1.44 mb Drive

Applied Engineering's SuperDrive-compatible 1.44 Mb high density drive looks, feels runs, reads, writes, stacks and even smells like Apple's But it costs hundreds less. Access files almost instantly and copy disks without continually swapping disks. This drive incorporates the same high quality Sony Mechanism Apple uses and features auto-eject MS-DOS compatibility and exclusive two-way read/write indicator light. Also available in 800K.

1.44 MB Drive $225
800k Drive $195

EMAC Impact Drive

The EMAC Impact hard drives pack all the power and convenience of a full-sized drive into a compact chassis. Now all your files and applications can be stores in one easily accessed location. Impact drives come in three capacities and are built with precision-engineered drive mechanisms for whisper-quiet, high-speed operation.

105 mb Drive $805

Hard Drives

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70MB Internal ..... 735.
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330MB Internal ..... 1995.
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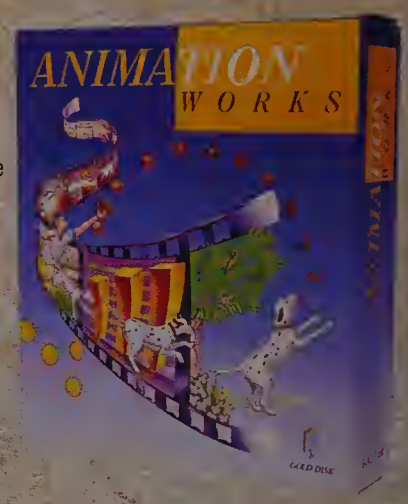

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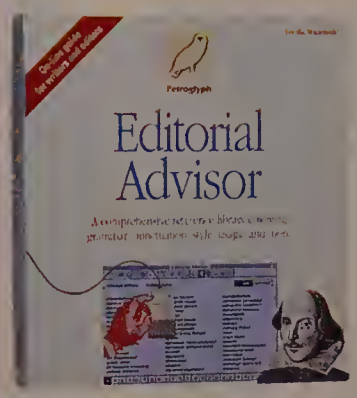

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bility for continued access to banking or brokerage services if you lose your account. And Prodigy has no responsibility for maintaining or delivering private electronic messages to a member who is suspended or terminated.

Are these rules fair? I don't think so, but as a private company Prodigy and other companies can set their own terms of service. At least for now. This country is headed toward a debate about computers, privacy, and electronic communications that may shape the law, and thus the industry, for many years to come.

That debate should be revved up at an upcoming conference sponsored by Computer Professionals for Social Responsibility. The First Conference on Computers, Freedom & Privacy is scheduled for March 25 to 28 in Burlingame, California. (Contact CPSR for more details at 415/322-3778.)

One of the sure topics is legislation. Prodigy is working hard to convince the world that it's a publisher, like *Macworld* and other magazines, and so has the right to edit or prohibit postings on its bulletin boards. But legislators might decide that the interactive communications aspect of Prodigy makes it more like a common carrier (such as the phone company) and that Prodigy should be treated accordingly. That would mean some form of public access—bad news for Prodigy officials, but good news for Prodigy members who want greater freedom of expression.

I don't know what the future holds for Epson, Prodigy, or electronic communications. But I do know that there's a very real electronic community created whenever people have access to computers and modems. For many users at home and at work, E-mail isn't just a service, it's a lifeline. ■

(Research assistance by Carolyn Bickford.)

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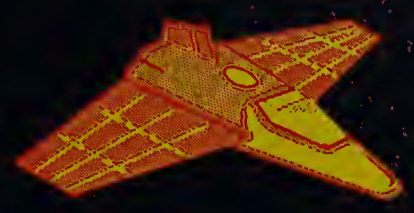

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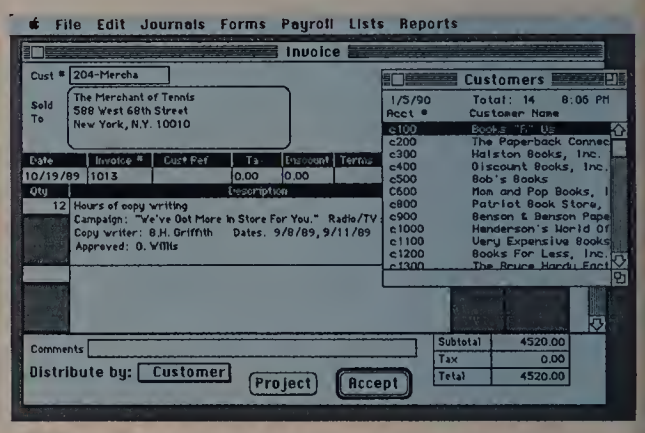

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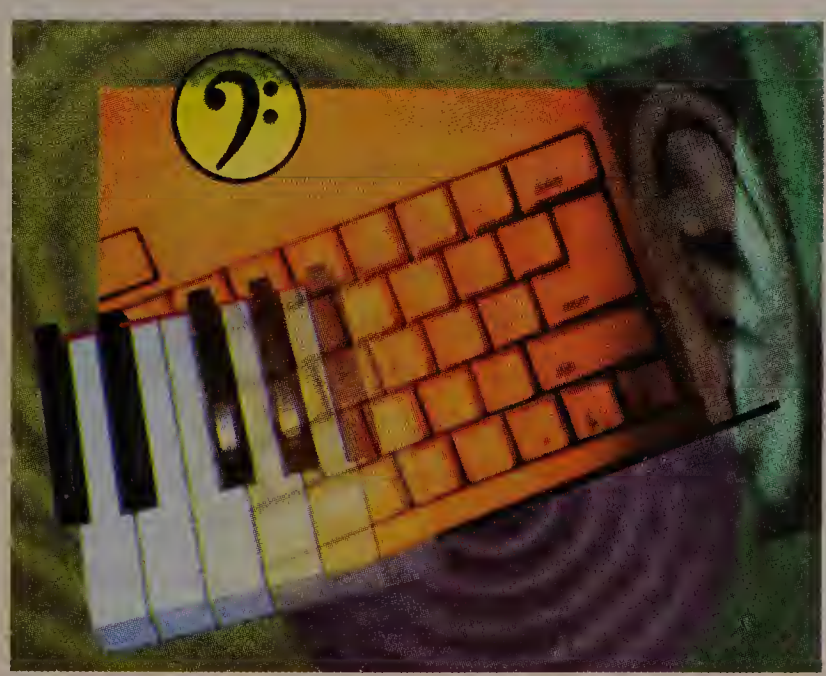
Making Music

You, too, can have a music studio in your own home

BY BRUCE F. WEBSTER

Music on the Macintosh has come a long way since the early days. It isn't that the original Mac did such a bad job—it just offered its share of obstacles—but systems such as the Amiga and the Atari ST were better known for their support of sound, music, and MIDI-based programs.

Things have changed, indeed. While the Atari ST remains popular within the music industry (perhaps the only place in the United States it does), the Macintosh is mounting a strong challenge to its primacy, thanks mostly to third-party developers who have pushed hard to develop bleeding-edge music software and hardware for the Mac. These products, developed initially for professionals and serious hobbyists, also open up new opportunities for students, at-home composers, and even those diving into the still-tenebrous waters of multimedia.



PATRICIA MCSHANE

Even Apple, which for years has treated sound like a poor relation (why put a stereo sound chip in a machine if you're only going to provide monaural output?), is getting its act together. A massive rewrite of the Sound Manager, scheduled for System 7.0 but included in System 6.0.7, fixes many bugs, provides consistent functionality across platforms, and adds new capabilities in digitizing and compressing sound. The Macintosh IIsi and Mac LC both come with sound-input ports (and a microphone). And Apple's MIDI Manager INIT and Patch Bay DA provide a universal mechanism for allowing MIDI-based software and hardware to talk to each other.

Prelude

Before delving further into this subject, some concepts and terminology should be discussed. *Sampling* or *digitizing* is a method of getting sound from the outside world (analog) into the Macintosh (digital). The sound comes in via a microphone or audio cable(s) from a stereo sound system. To convert the sound from an electromagnetic wave to a set of discrete digital values, an analog-to-digital (A-to-D) converter is used. The quality of the digitizing depends on two key factors: the *sampling rate* (how many times per second the wave is sampled) and the *sample resolution* (the number of bits used to represent the sampled value). The faster the sampling rate and the larger the sample resolution, the higher the quality of the digitized sound. Low-end sampling is usually around 8kHz (8000 samples per second), monaural (single channel), and uses 8 bits per sample; one minute of sound digitized at this quality would take up just under 470K of space. By contrast, compact discs use two channels of 44.1kHz and 16-bit sampling; one minute of digitized sound at this quality takes up 10 *megabytes*.

The MIDI (Musical Instrument Digital Interface) standard really is just that: a standard specification on both physical and logical levels for exchanging musical information between

(continues)

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various devices, such as keyboards, synthesizers, sequencers, and computers. The information moved about is not actually audio; it is instructions on how to create audio, including when to turn notes on and off, setting timing, selecting instruments, and so on. MIDI hardware is based on serial transmission, but with special cables and a fixed baud rate; a MIDI interface for the Mac typically consists of a separate box hooked up to one or both serial ports (modem and printer) on the Mac. (A good primer on MIDI is *MIDI for Musicians* [Amsco Publications, 1986] by Craig Anderton.)

There are two basic types of sound in electronic instruments: synthesized and sampled. Synthesized sounds are usually generated by pushing data through special-purpose hardware, such as a digital signal processor (DSP). Sampled sounds come from digitized recordings of actual instruments (or people or phenomena), which are then played back. Synthesized sounds are easier to generate; sampled sounds are more true-to-life.

MIDI devices are described in terms of *instruments;* a device might have just one instrument, or it might have several, or it could even have hundreds. Devices are typically (though not always) *polyphonic,* that is, able to play multiple notes simultaneously as a chord. MIDI devices are also often *multitimbral,* able to play multiple instruments simultaneously. Each active instrument is typically assigned to one of 16 MIDI *channels* and responds only to MIDI instructions associated with that channel, ignoring all others.

A *sequencer* is a MIDI device (real or virtual) that records sequences of MIDI instructions, then plays them back. A given sequence is usually assigned to a specific MIDI channel; several sequences can be played simultaneously, allowing multiple instruments or devices to be driven by the sequencer.

Theme

How does one go about using all this technology with the Macintosh? A good start is a MIDI-producing instrument of some sort, such as a keyboard or synthesizer. At home, I have a Korg Concert-7000 digital piano, a Korg Symphony Orchestra module (which comes with several sampled instruments), and a Yamaha EMR-1 Digital Drummer. These devices are all connected to each other via both MIDI and audio cables, so that the orchestra and drum boxes can be "played" from the piano, and the output from all three can be blended together. But anyone playing (usually my wife) is still limited pretty much to playing in real time with two hands.

Enter the Macintosh. The first step is to establish a hardware interface between the MIDI instrument(s) and the Mac. Since MIDI is a serial technology, the equipment involved forms connections between the modem and/or printer ports and the MIDI cable(s). Companies such as Opcode Systems (415/369-8131) and Mark of the Unicorn (617/576-2760) offer a variety of boxes and rack-mount devices to do that. My home setup uses the Opcode Systems Studio Plus Two. It provides two MIDI inputs and six MIDI outputs, but I use only half of them: one input (from the piano) and three outputs (to the piano, orchestra box, and drum box).

The MIDI hardware interface by itself doesn't help; you need some sequencing software to take advantage of it. As mentioned above, a sequencer records MIDI information for later playback; Macintosh-based sequencers give you tremendous flexibility in creating, modifying, and saving multitrack compositions. Sequencing software available includes EZ Vision, Vision, and StudioVision (Opcode Systems); Performer (Mark of the Unicorn); and Cubase (Steinberg/Jones, 818/993-4091).

The process of creating a multitrack composition is simple, at least in concept. First, you launch the sequencing software and make sure it's talking to the correct serial/MIDI port. You then select which track to record first (typically, you have 16 or 32 to choose from), click on the Record control, and start playing on the MIDI instrument. The MIDI codes produced by the instrument—which contain information about pitch, volume, and duration—are recorded in the Mac's memory by the sequencer. When you're done, you click on the

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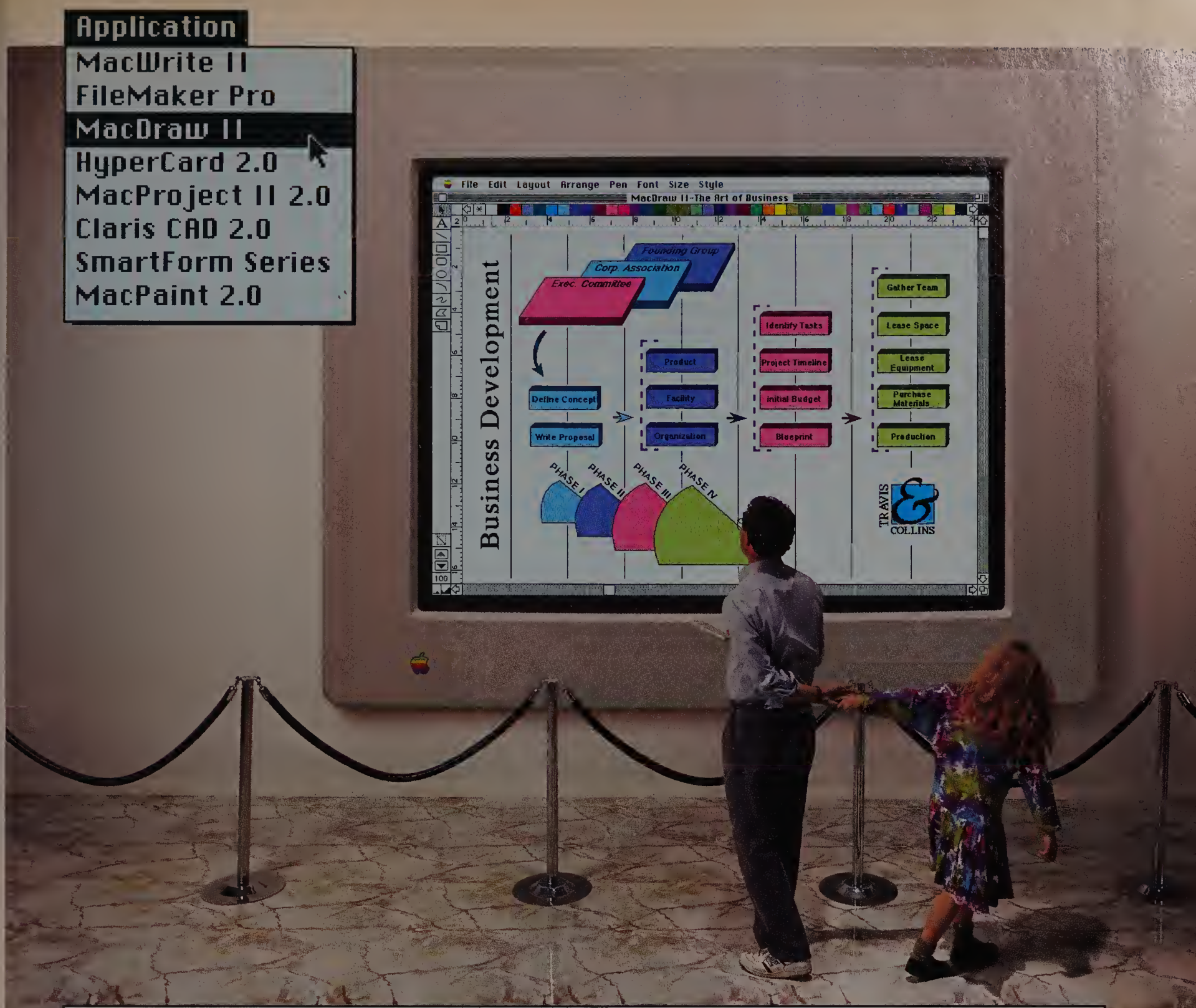

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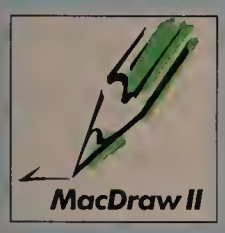

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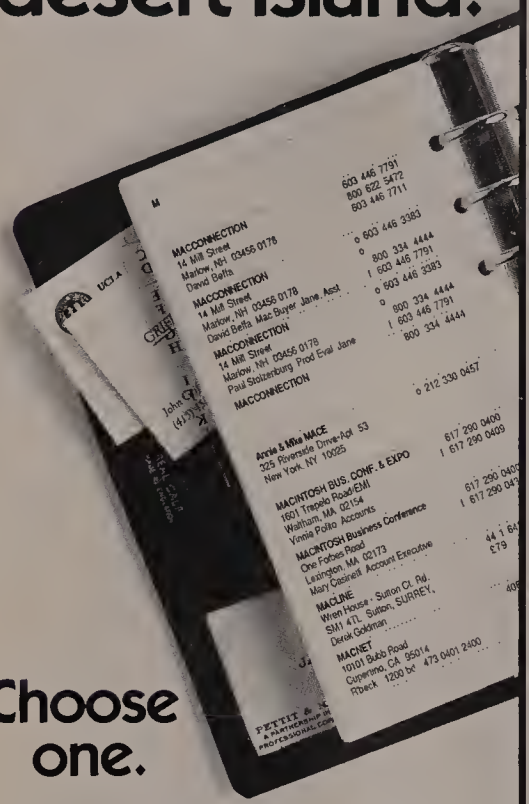

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Stop control. (If you're smart, at this point you save the file.)

You can now play back the track you've created. The Mac itself doesn't play anything; instead, it sends the MIDI codes back out over the MIDI outputs. You chose beforehand which MIDI channel the track is associated with; any connected MIDI device that has one or more instruments assigned to that channel plays the incoming notes on those instruments.

You can do a lot more than that, too. Sequencing software lets you edit what you've played on a note-by-note basis, rerecord selected segments, transpose what you've played into different keys, adjust the playback tempo, overdub new notes onto an existing track, and (of course) record additional tracks. Each track can be assigned to a different MIDI channel (and thus drive a different instrument), or several tracks can all drive the same channel, allowing performances not possible without electronic assistance. Some sequencers let you do dynamic mixing, changing the volume and *pan* (left-right positioning in stereo output) of each track as it's playing. And, of course, you can save the entire composition to disk and reopen it at a later date for modification and playback.

Once you start playing with a keyboard and sequencers, you find yourself craving more instruments to play. After all, you want to use those tracks for something other than piano. You can invest in external MIDI devices (such as the Korg orchestra box I have), but there are other solutions. One is the MacProteus board from Digidesign (415/688-0600). This board, which plugs into any NuBus slot, emulates the E-mu Systems Proteus synthesizer. It has 192 sampled instruments (organized as three 64-instrument banks), it is 16-voice multitimbral and 32-note polyphonic, and it offers a wide array of functions and features. The MacProteus doesn't have direct MIDI input; instead, it relies on the Apple MIDI Manager and the Patch Bay DA (both included with the MacProteus board) to establish internal and external connections. Thus, you can drive it directly from a keyboard or through a sequencing program. Audio output is via a headphone jack and a standard pair of left/right audio line-outs.

One of MacProteus's bundled utilities (and there are several) lets you make and change channel and instrument assignments, even while music is being played. This lets you easily try out different instrument combinations for a given composition. You can also load new instruments—up to 64 at a time—into the MacProteus board, since one of its three banks is RAM-based (the other two are burned into ROM). Once you have a configuration you like, you can save it out to disk, to be loaded back in at any time.

Variations on a Theme

OK. You've got the keyboard, the MIDI interface, the sequencer, and the extra instruments. What more could you ask for?

How about a way to record your compositions? Sure, you could route keyboard (or MacProteus) output to a stereo system and record the output on a cassette tape, but you lose quality in the process. And if you copy that tape, you lose more quality, and so on until your masterpiece sounds like strained mush.

Relax, there are solutions. One is Audiomedia, a NuBus board from Digidesign. The Audiomedia board has a Motorola 56001 DSP chip, the same chip used for sound and music processing in the Next family of computers. Using the DSP, the Audiomedia board can sample incoming sound at full CD quality: 44.1kHz stereo, 16 bits per channel. It can also play back digitized sound and music at the same rate. You can do direct editing and manipulation of digitized sound, create playlists of sampled sound and music to be played in a certain order, and create sound resources to be used in HyperCard, MacroMind Director, and other programs.

To use Audiomedia with MacProteus, just use standard audio cables to connect the MacProteus outputs to the Audiomedia inputs. The only tricky part is that the tape deck panel in the Audiomedia software is modal (bad design, folks). This means that once you bring the panel up, you can't switch back to your se-

(continues)

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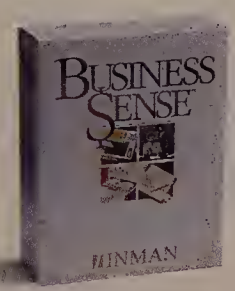

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quencing software to start it playing. Instead, you have to leave enough dead time (empty measures) at the start of a composition to allow you to switch from the sequencer to Audiomedia, bring up the tape-deck panel, and punch Record before the music starts playing.

Be aware that if you're going to use Audiomedia, you need a large, fast hard drive. CD-quality music eats up 10MB of disk space for each minute of playtime, and the disk itself has to have an access time of 28 milliseconds or less to handle the incoming stream of digitized sound.

If you want (or need) to get really fancy, Digidesign distributes Deck, a software package from OSC Products that turns the Audiomedia board into a four-track digital recorder/mixer. Some of its features are handled by sequencing software, but it does allow you to readily mix sequenced and live sound. Of course, you need lots and *lots* of disk space, and high-capacity removable media of some sort (Bernoulli box, optical drives) would help multiply disk storage. But you might find it worth it.

Coda

You're almost set. You can play at your keyboard, create sequences, select instruments, and produce CD-quality, four-track recordings. Anything else you might want?

How about automatic transcription of a composition, with hard copy music sheets as a result? The company is Coda Music Software (612/854-1288), and the products are MusicProse and Finale. MusicProse is described as "music composition and publishing software," and that's pretty much what it does. Coda intended the program to be a smaller, less-expensive, and easier-to-use alternative to Finale. In this case, smaller means more than 250 pages of documentation, and cheaper means $399. For that, you get a product designed (according to Coda) for creating, editing, and printing lead sheets, piano-vocal scores, and small ensemble scores. It includes special fonts for music notation and guitar chords and supports real-time transcription of MIDI input; in short, it writes music notation as you play.

After looking at MusicProse, one could ask what more Finale has. A lot. More, in fact, than can be reasonably described here. Here's a clue: it comes with three 7-by-12-inch spiral-bound manuals totaling nearly 1000 pages of documentation—and it appears to be meaningful, well-written documentation, detailing more about music notation than I believed existed. It's probably the only $1000 (well, $995) software product I've seen that looks as though it's *worth* $1000, though I'll leave it to professionals to decide that.

While none of these products are cheap, you can put together a low-end system for surprisingly little. A basic MIDI interface can be had for under $100; sequencing software is also fairly inexpensive (EZ Vision lists for $149), and you can use both on a Mac Classic. You can find MIDI-compatible keyboards for under $1000, so your complete setup (including a Mac Classic with hard drive) should cost less than $3000.

On the other hand, you can spend a lot of money surprisingly fast. Vision lists for $495; MacProteus, for $895; Audiomedia, for $995; Deck, for $349; and Finale, for $995. Grand total: $3729. And that doesn't include the Mac IIci (or better) that you'll need, along with the 4MB to 8MB of RAM and the fast, high-capacity disk drive. You may even find yourself wanting a large-screen display, since even a Mac II display gets crowded with several of these applications up and running at the same time.

Before rushing out to buy any of these wares, examine your needs, wants, and resources carefully. Reviews of most items mentioned can be found in recent issues of *Macworld,* though in some cases later versions have been released. Also, remember that you can start small and build up as skill, money, and interest dictate. And who knows? Maybe you'll finally get out those songs you've had inside for so long. ■

Contributing editor Bruce F. Webster is vice president of R&D at San Diego–based Pages, Inc. He can be reached via BIX (bwebster) and via MCI Mail (Bruce Webster).

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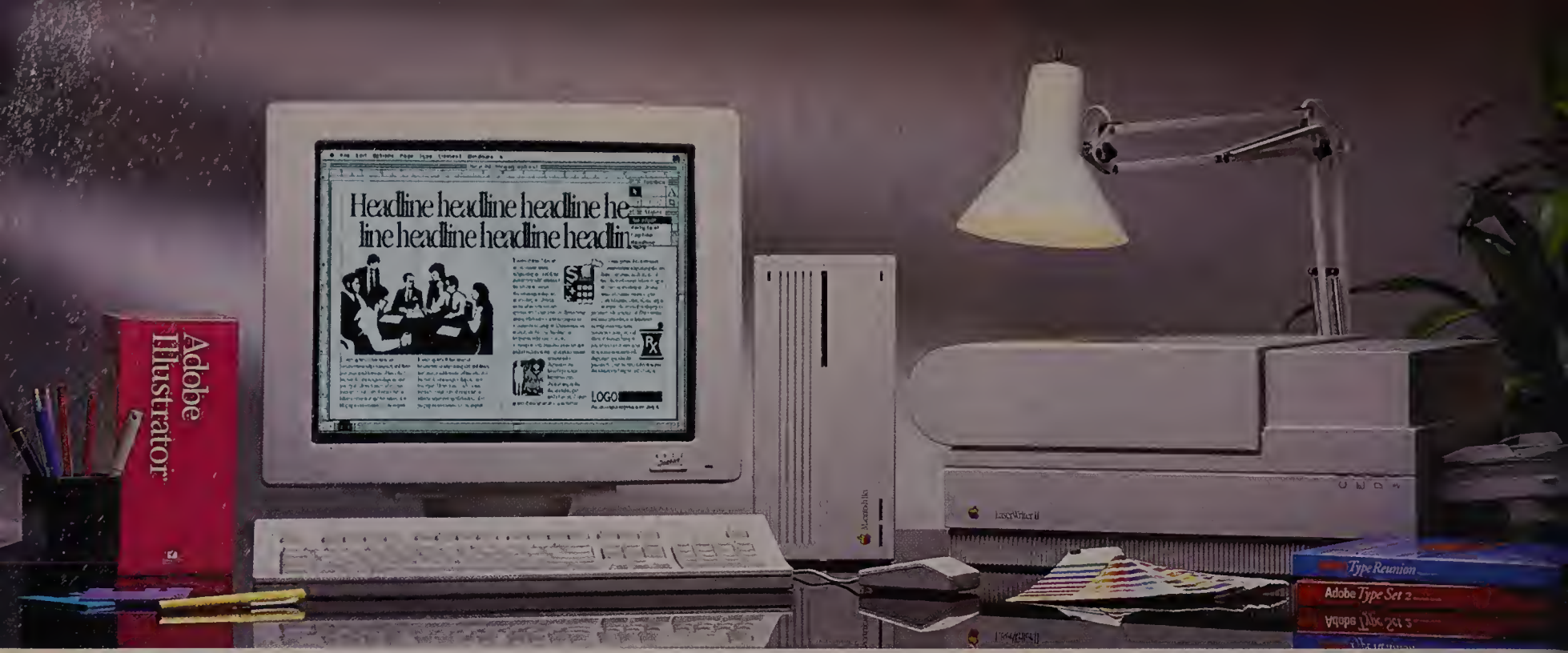

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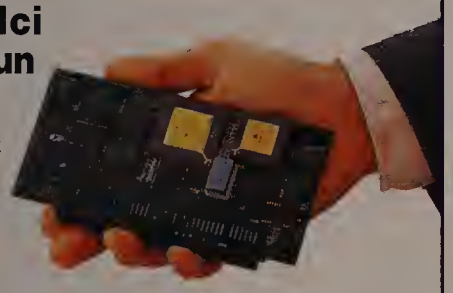

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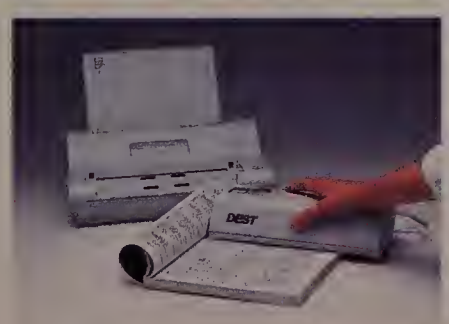

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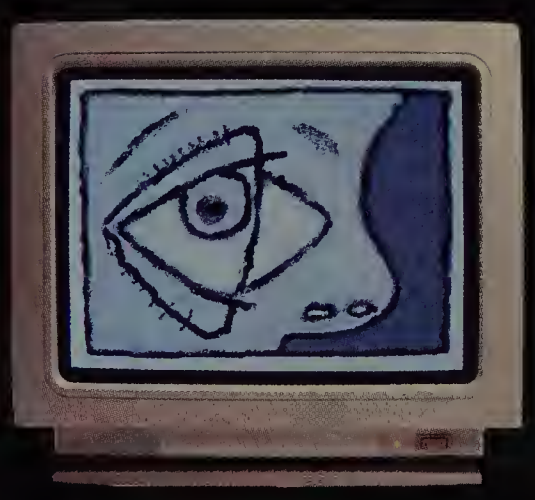

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MACWORLD NEWS

by Dan Littman and Tom Moran

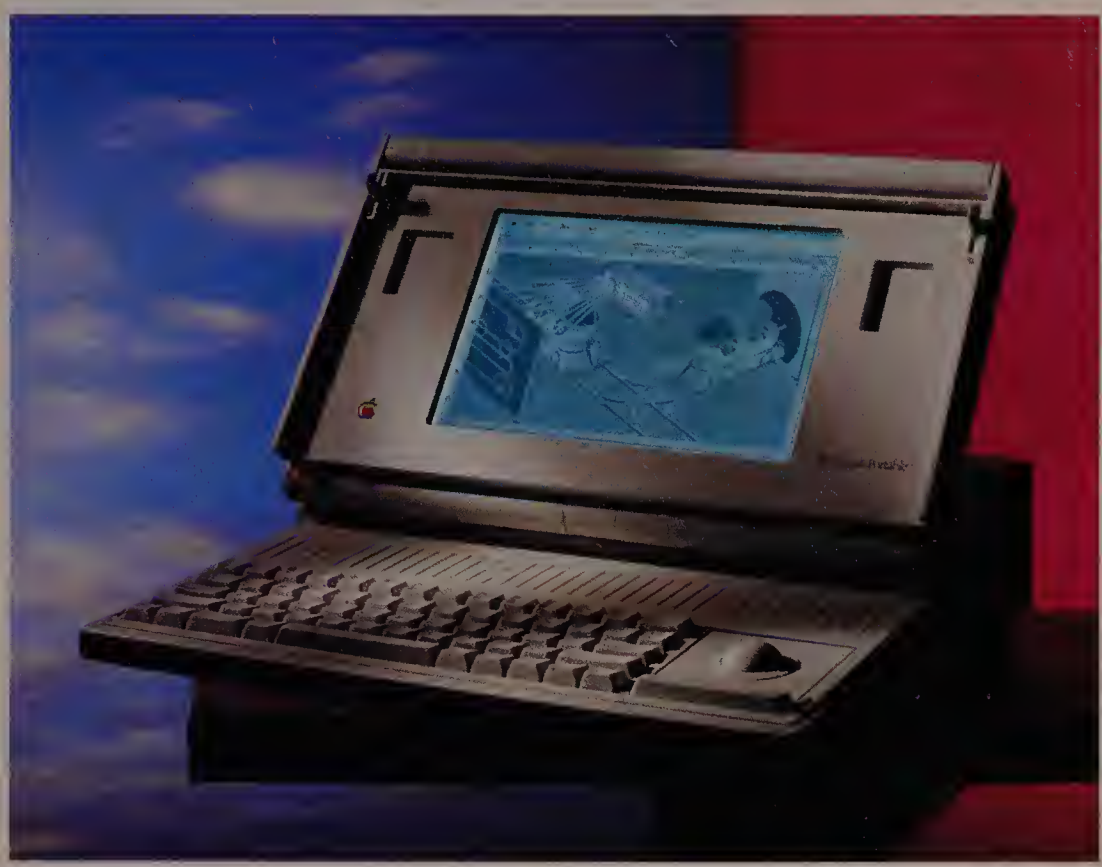
Apple Delays Backlit Portable

A problem with addressing memory on the system board has delayed Apple's introduction of its backlit LCD version of the Macintosh Portable, and has put the machine's future in doubt. Apple originally planned to introduce the backlit Portable on January 10 at the Macworld Expo and to begin shipping that day, but at press time Apple said that the system would not be available until mid-February at the earliest. One knowledgeable source inside Apple said there was a 25 percent chance that the backlit Portable would be cancelled completely.

The RAM addressing problem occurred after Apple designed in pseudostatic RAM to replace some of the costly static RAM on the backlit Portable's system board. It was not clear at press time whether the problem was directly related to the use of pseudostatic RAM. Apple said the new, less expensive RAM design was part of the reason the company intended to lower the new Portable's retail price by about $1800 while adding the adjustable backlighting feature.

At the moment there are three possibilities: Apple may decide to fix the glitch, ship the new Portable with the glitch, or kill the project entirely and devote its engineering resources to other projects in the area of portables. If it decides to ship without fixing the problem, the amount of addressable RAM might be limited to 5MB, and there could be problems with third-party RAM upgrades.

Although the backlit Portable was intended to replace the current model, availability of the original Portable will not be affected, Apple said. The company described the backlit Portable as a "course correction," and emphasized that Apple is committed to creating a family of portable computers of different sizes, implying that a true laptop is in the pipeline.



MARK JOHANN

A prototype of a new model of the Macintosh Portable includes a backlit LCD screen. The system has been delayed and may be cancelled due to problems with addressing RAM.

Even in normal lighting conditions, the added backlighting greatly improved the legibility of the new Portable's display on a prototype shown to *Macworld*. Apple said at the time of the original Portable's introduction that it decided against backlighting because of the power drain and resulting shorter battery life. The battery life of the backlit Portable is rated at three to six hours with the backlighting on, depending on how high the backlighting is set, frequency of drive accesses, and so on. With the backlighting off, the battery life is the same as the original Portable's six to twelve hours.

When and if it becomes available, the new Portable will come in two models: the Macintosh Portable 2/40 with 2MB of RAM and a 40MB hard drive, and the Macintosh Portable 4/40, which will have 4MB of RAM and the same internal drive. The Macintosh Portable 2/40 will have a new list price of about $4200, down from about $5998 for the original Portable. The Portable 4/40's list price will be about $4700. Prices were not firm at press time.—**T.M.**

Ray Tracing for Laypeople

The folks who wrote Ray Dream Designer spent their programming days up in the Santa Cruz mountains looking down across Silicon Valley, instead of buried in a dark well of monotonous of-

(continues)

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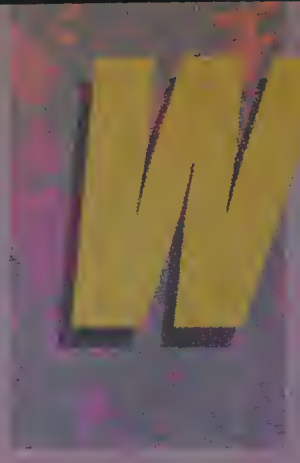

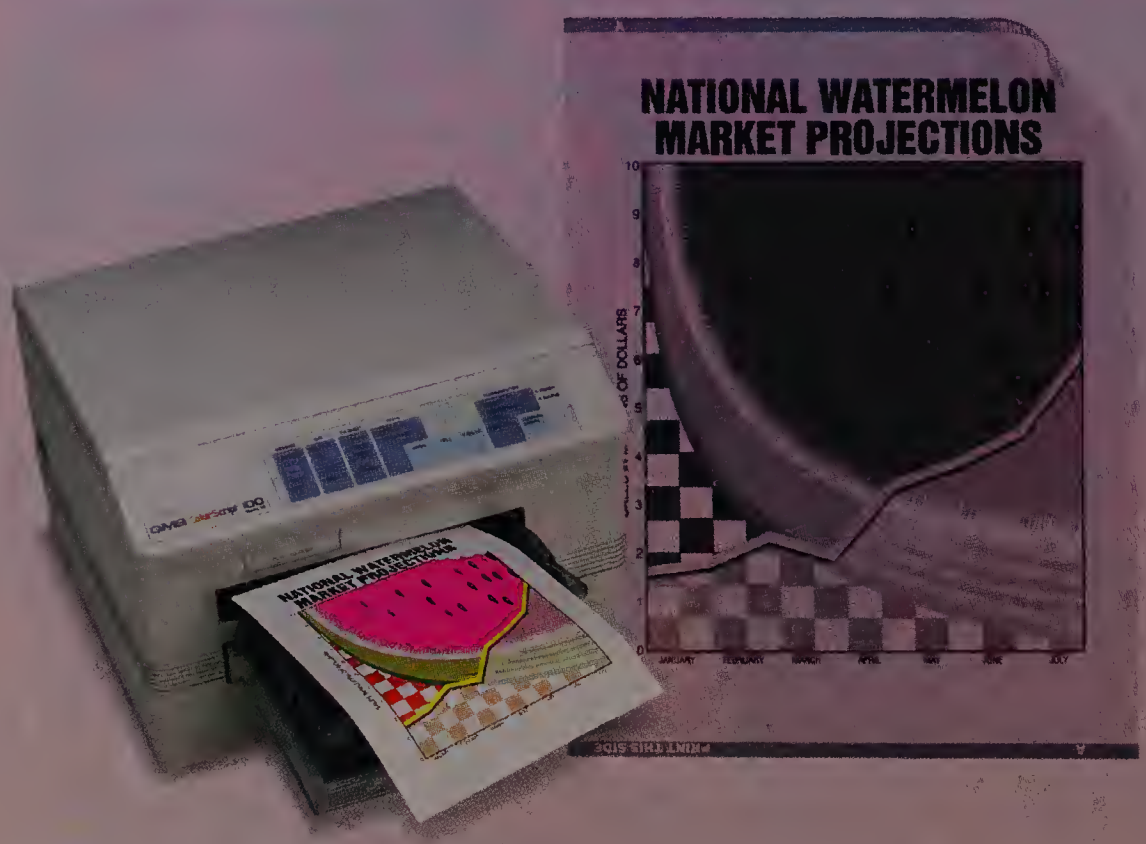

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Circle 104 on reader service card

fice cubes. Maybe that's why Ray Dream Designer presents three-dimensional space in a way that the visually illiterate can grasp.

Ray Dream Designer is really two programs: LightForge, where you create objects and describe their surfaces; and SceneBuilder, where you bring objects together and render them.

LightForge has a typical modeler's three-window view. You draw a 2-D base for an object, and then extrude it along any combination of lines, splines, and beziers. Setting points to stretch, squeeze, or bend the object is like setting tabs on a word processor's ruler. You can also lasso and autotrace a piece of a PICT image and apply all LightForge tools to it.

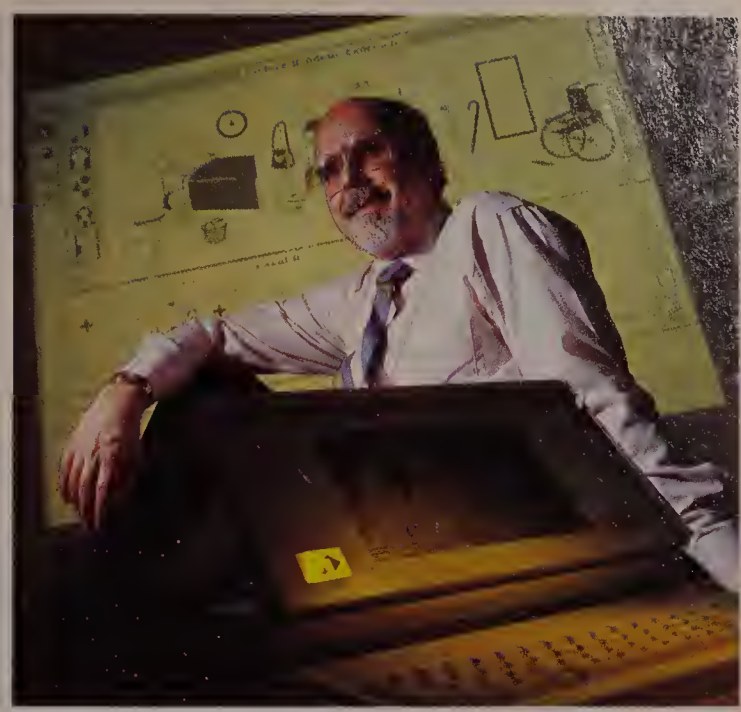
Ray Dream's rendering tools are impressive. Its solid shaders can create effects like extremely gnarly wood, or marble that looks like concrete with hot pink veins. It supports bump maps (for example, sandy surfaces), and when you apply a texture map (for example, putting a label on a bottle) Ray Dream provides 3-D registration marks to line everything up.

In SceneBuilder, each object projects an outline of itself against two walls and the floor of a room, making it impossible to get lost in space. If your scene gets too complex, you can collapse hierarchically linked objects like subheads in an outliner (for example, hiding the chairs surrounding a table) or zoom in on a single object's subobjects. Object hierarchies can be rearranged in a tree-chart window, an ideal interface for managing animation—too bad Ray Dream has no animation.

Ray Dream images are highly compressed in memory (a 6MB file fills only 100K of RAM) so it easily shares a Mac with other programs under MultiFinder. It can batch-render images in the background, interrupt and resume a job, and replace the background without re-rendering. Its ray tracing is fast and can do things like bend light passing through transparent objects (you can even set the index of refraction), but it leaves edges unpleasantly hard and exact.

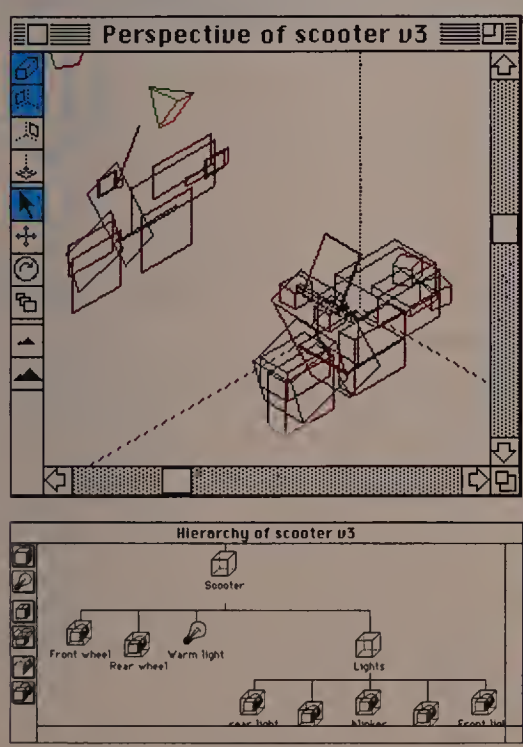
Ray Dream is also developing a utility, code-named Dark Edge, that will antialias batch files such as frames of an animation.

Ray Dream Designer lists for $895 and requires a math coprocessor; a demo version is available for $39.95. For more information, call Ray Dream in Woodside, California, at 415/851-0943.—**D.L.**



ROBERT HOLMGREN

Dr. Richard Steele and Lingraphica, an iconic language to communicate with and rehabilitate the language impaired.



MARK TATOU, ZIP-ZIP ART

Top left: Ray Dream's SceneBuilder, showing the assembled pieces of a scooter in wireframe. Bottom left: the hierarchy of linked objects with lights. Right: fully rendered.

A Language for Aphasics

Strokes and head injuries can affect the victim's ability to use language. This condition, called aphasia, can range from what one linguist describes as a constant, mild "tip-of-the-tongue" feeling to being completely unable to read, write, speak, or even understand what others say.

Unlike the hearing impaired, who have elaborated a subtle, sophisticated language of gestures, aphasics have had little alternative but to struggle with rehabilitation. Now a group of scientists have created Lingraphica, a graphical language for speech pathologists to use with aphasics—and that aphasics may learn to use to communicate among themselves or with their families.

Lingraphica strings together icons representing words and concepts into sentences. A speech pathologist draws up words from the database of icons using text typed into a Mac Portable; aphasics can also access words using a graphical searching method. Lingraphica's syntax is simpler than English, so it is not possible to merely convert English text to the new language. The first version of Lingraphica is text dependent: only people who can read and write will be able to add new icons to the database. Later versions may be completely independent of text.

(continues)

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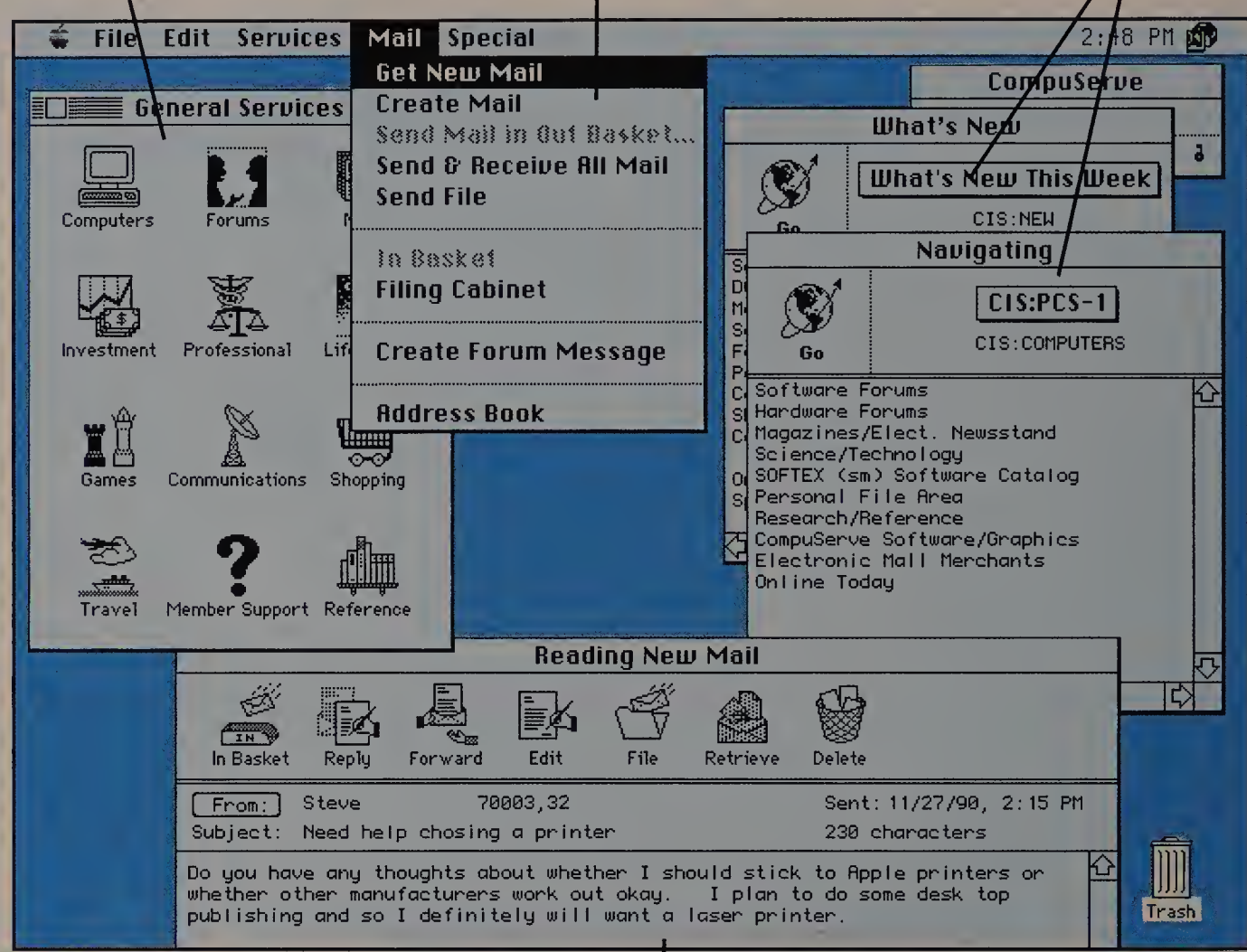

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Circle 319 on reader service card

Richard Steele, who holds a Ph.D. in linguistics and is one of Lingraphica's principal designers, wonders about the implications of creating a new language: What will happen to his company's copyright when, as is inevitable, Lingraphica users begin to evolve the language? How long will it be until someone puts up an online information service for aphasics? And what if the Mac Portable proves too bulky a platform and someone clones Lingraphica for a notebook computer?

Pricing for Lingraphica was undecided at press time. For more information, contact Tolfa in Palo Alto, California, at 415/494-3220.—**D.L.**

STEVE BLOCH

The 5000M Direct View from In Focus Systems is a color LCD display intended for portable presentations.

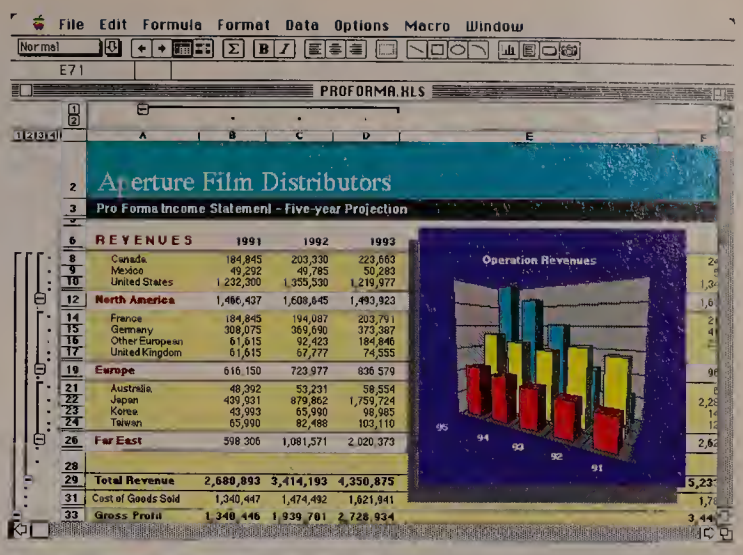
Color Display to Go

In Focus Systems, maker of color LCD projection panels, has adapted its technology to make a portable color monitor intended for presentations. The 5000M monitor, the first in the company's planned Direct View series, uses multiple stacked LCD panels and the subtractive method of producing color. Three panels produce cyan, magenta, and yellow, respectively. Each panel can produce its color in 17 different intensities, so the number of colors that can be displayed at once is 17 to the third power, or 4913.

The first version of the 10½-inch-diagonal 5000M will operate at 14 frames per second, not fast enough to eliminate ghosting when the cursor is moved rapidly across the screen. By March, In Focus expects to have sample quantities of a color LCD with a refresh time of less than 80ms, which should eliminate cursor ghosting. In 1991 the company hopes to have a version that will support the video refresh rate of 30 frames per second.

When unfolded for carrying, the six-pound device has about the same length and width as a Mac II. It folds up into an easel arrangement for display; its 50w light source reflects off a mirror in back and then projects forward through the LCD panel. Because the light source is an incandescent bulb, the 5000M does not emit the extremely-low-frequency magnetic fields common to most CRTs.

Slated to ship to OEMs in the first quarter of 1991, the 5000M will initially come in versions for the Mac SE or Mac II series. The company had not set prices at press time, but said it hoped that retail prices for the color LCD monitor might be as low as $2500. For more information, contact In Focus Systems in Tualatin, Oregon, at 503/692-4968 or 800/327-7231.—**T.M.**



Key features in Excel 3.0: 3-D graphs in the worksheet window; outlining (shown here down the left side); style sheets.

The Mature Excel

Some military wit once remarked that China's air force flies the world's most advanced obsolete aircraft. Like those Chinese aircraft, Excel 3.0 is highly sophisticated and an inexhaustible workhorse of a program. Still, other products are redefining what a spreadsheet is and leaving Excel a little behind the times.

Excel 3.0 has Word-like style sheets for formatting text and numbers, and an outlining system that collapses rows or columns intelligently (such as, creating a hierarchy based on subtotals).

You can consolidate multiple worksheets into a summary sheet using row or column headers instead of cell numbers, so that links survive changes to the source worksheets. Data sheets can be combined as a Workgroup, with formatting and even formulas propagated to all sheets.

Excel 3.0 has buttons, a Full Impact–like (but unchangeable) icon bar across the top, and Wingz-like 3-D graphing tools. Graphs float with a set of drawing tools on a transparent layer above your data.

Excel 3.0's data-analysis tools are also improved, with a single-variable linear optimizer called Goal Seek built in, and Solver, a nonlinear, multivariable add-on that will be bundled.

More useful improvements in Excel 3.0: double-clicking widens columns to match the widest cell's contents; Page Preview is a menu command, and its dialog box can go directly to Page Setup; for table designers, text can wrap inside cells; number formatting can change based on thresholds (for example, red below zero, black from zero to 10, and green above 10); and you can enter and calculate fractions.

Less mature data-analysis products are changing the turf under Excel's toes. Lotus Improv (announced for Next but not for the Mac) will understand data well enough to select related information (for example, several subtotal rows) *(continues)*

WITH A REMARKABLE NEW ENGINEERING PRODUCTIVITY TOOL CALLED HiQ™, AN AEROSPACE ENGINEER CAN NOW COMPUTE THE TRAJECTORY OF A SPACE VEHICLE IN 30 MINUTES.

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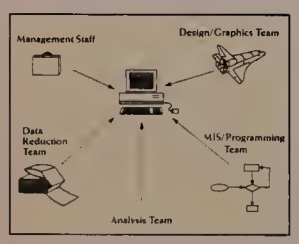
HiQ's interface is an electronic extension of the engineering "project notebook." It's easy to learn and simple to use because you already know how. The notebook paradigm lets you design and utilize specialized tools for solving your problems. Any of the notebook's data items, scalars, vectors, matrices, graphs, programs (*scripts*), etc. have an associated editor and are integrated with a common "look and feel."

MAINFRAME POWER AND 5x–10x PRODUCTIVITY GAINS CAN BE YOURS.



Take a deep breath and consider—HiQ has the richest and most extensive function library of any engineering program. Over five hundred robust built-in functions right at your fingertips. Features and capabilities not available in any other commercial product. Many of the most powerful microcomputer mathematics programs in the world. And HiQ also gives you the flexibility to design your own tools. Imagine having the power and the ability to design and use a specialized engineering tool you've created—in a single day.

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- *A powerful program for finding real and complex roots and functions*
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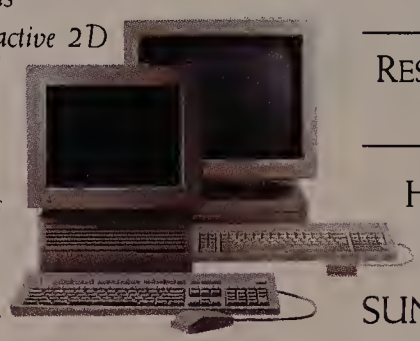
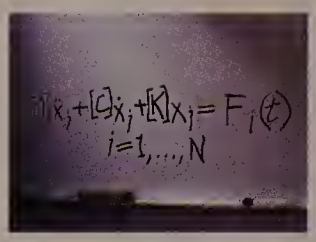
- *A full complement of digital signal processing routines*
- *All of the special functions of applied mathematics.*

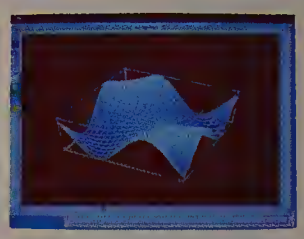


Plus several higher level capabilities. For instance, HiQ's numerical editor enables you to determine both the structure and mathematical characteristics of any matrix of any size. The Optimizer contains linear programming, nonlinear unconstrained and constrained programs based on the best available algorithms successfully used on scientific mainframes. The Fourier and Statistical Analyzers have been developed and tested by specialists in those disciplines. And the



scientific graphics program (Grapher) has essentially all the features of a stand-alone program. These include a completely interactive graphical environment permitting a variety of manipulative capabilities (e.g., viewing angle, aspect ratio, zoom in/out, color, shading, perspective/orthographic mode).

AND HiQ INCLUDES QSCRIPT,™ THE FIRST 4GL FOR ENGINEERING/SCIENCE.



HiQ contains the two essential elements necessary for developing specialized engineering programs: a powerful programming language (the *first* 4th generation language for engineering/science) and an extensive library of built-in functions. By constructing new permanent functions, sophisticated programs can be rapidly developed enabling dramatic 5x–10x productivity gains.

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with a single click, though it will lack a macro language. Serius Business creates 12-dimensional worksheets that exist as records in a database, providing mind-boggling ways to sort and slice through data.

Excel 3.0 will list for $495. For more information, call Microsoft in Redmond, Washington, at 206/882-8080.—**D.L.**

ROBERT HOLMGREN

Dr. Christopher Cann's company is marketing Mac software that can be used to analyze CT scan results.

Bare Bones Mac

Osteoporosis is a leading cause of disability among older people, particularly elderly women. Bones weakened by mineral loss are prone to fracture, especially in the spine and hip.

Measurements of bone density have been used for years to detect mineral loss. Quantitative Computed Tomography (QCT), developed in the late 1970s, uses low-intensity X rays produced by a CT scanner to measure bone density in the spine, but the practice requires meticulous attention to technique.

Researchers at the University of California, San Francisco, have designed new software to help standardize QCT test procedures. QCT-Bone Mineral Density Analysis runs on any Macintosh from the Plus on up, and is compatible with most modern CT equipment. It requires a special device called a calibration phantom that fits into the CT scanner under the patient.

The program's detailed analysis provides a comparison between the patient's bone density and normal values for the patient's sex, age, and ethnic group. The software also prints a graphical estimate of the patient's risk for vertebral fracture and automatically compares results from multiple examinations.

QCT-Bone Mineral Density Analysis costs $2500. For more information, contact Image Enhancements in San Francisco at 415/291-8772.
—Franklin N. Tessler

Power Requirements Limit Mac IIsi Expansion

Because the Mac IIsi costs about $2000 less than a Mac IIci, users may be tempted to try to expand it into an engineering workstation. The Mac IIsi has one-slot expansion capability, but not all NuBus expansion boards can be safely used with the new system because of the limited power design of the IIsi.

Those seeking 24-bit true-color systems should be very careful about the board they buy for the job. Replacing the internal hard drive supplied by Apple with a more power-hungry one can push some 8-bit, dual-page color boards into the red zone (see "Power Drain of Some IIsi Graphics Boards").

Apple has always insisted that NuBus boards should draw less than 15 watts per slot, but since previous systems allowed 35w total power, some manufacturers ignored Apple's warning and made 24-bit color boards drawing over 15w. They reasoned that people don't really use all of the slots, so there is power left over. But Apple's own NuBus adapter spec for the IIsi calls for no more than 13.3w to be drawn by the single NuBus board.

Even Apple violated its rule, when it designed the 24-bit Macintosh Display Card 8•24 GC, which draws 20w. Other boards that went over the line include the Radius DirectColor/24 (17.5w) and SuperMac's ColorCard/24 (19.15w with graphics accelerator), Spectrum/24 Series III (18.75w), and Spectrum/24 PDQ (16.8w). All these boards are used with two-page monitors (1024 by 768 resolution or higher), except the ColorCard/24, which *(continues)*

POWER DRAIN OF SOME IIsi GRAPHICS BOARDS

Company	Board	Power Required	Resolution
Apple	Macintosh Display	20w	1024 by 768
	Card 8•24 GC		
Radius	DirectColor/24	<10w for 8-bit	1152 by 882 or
		<17.5w for 24-bit	1024 by 768
	DirectColor GX	<10w for 24-bit	640 by 480
	GSC	<10w for 8-bit	1152 by 882 or
			1024 by 768
SuperMac	ColorCard/24	12.95w for 24-bit	640 by 480
		19.15 w/accelerator for 24-bit	640 by 480
	ColorCard/8 [1]	7.25w for 8-bit	640 by 480
	Spectrum/8 Series III	9.45w for 8-bit	1024 by 768
	Spectrum/24 Series III	18.75w for 24-bit	1024 by 768
	Spectrum/8 PDQ	11.3w for 8-bit w/accelerator	1152 by 870
	Spectrum/24 PDQ	16.8w for 24-bit w/accelerator	1152 by 870
RasterOps	8L	10w for 8-bit	1024 by 768
	24L	7.5w for 24-bit	1024 by 768 or
			1024 by 1024
	ColorBoard 364 [2]	9.5w for 24-bit	640 by 480
Relax Technologies	View II	10w for 8-bit	1024 by 768
Lapis Technologies	ColorServer IIsi	4w [3] for 8-bit	1024 by 768
E-Machines	ColorPage T16/8	12.08w for 8-bit	832 by 624
	ColorPage T16/24	9.5w for 24-bit	832 by 624
	ColorPage T19si	12.62w for 8-bit	1024 by 808
		9.5w for 24-bit	1024 by 808

[1] Discontinued. [2] Real-time video in, NTSC out. [3] Using the 030 Processor Direct Slot, which has a 7w allowance.

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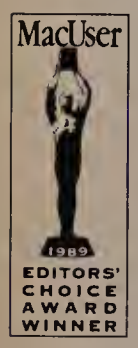

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is used with 640 by 480 systems.

The other way users can get into power trouble is to swap out the internal hard drive that comes with the IIsi for a more power-hungry drive, and then use the resulting system with a color board that is near the 13.3w barrier. For example, Apple uses the one-third-height Quantum 80MB drive, which draws about 6w, but some dealers instead sell a system using a 105MB Quantum hard drive, which draws 8w. The extra 2w come out of the 13.3w NuBus budget, reducing it to about 11w. Attaching external SCSI devices such as CD ROMs and scanners doesn't affect the NuBus power draw, since those external devices supply their own power.

Those video boards that would be most affected by a hard drive swap are SuperMac's ColorCard/24 without accelerator (12.9w) and Spectrum/8 PDQ (11.3w), and Lapis Technologies' ColorServer IIsi (an 030 Processor Direct Slot board that must operate within a 7w budget).

The failure modes related to overdriving the IIsi power supply range from a simple refusal of the system to start up (because it recognizes an obvious power shortage) to the overheating of the 68030 processor chip. Overheating also results from the very tight physical design of the IIsi, which places the CPU chip directly under the expansion board.—**Martin Marshall**

ROBIN GINSBERG

The Tektronix Phaser II PX color wax-tranfer printer is compatible with the Pantone color-matching system.

Tektronix Introduces Color Printers

Tektronix recently replaced its PostScript-based Phaser PX color wax-transfer printer with the Phaser II PX, a smaller and lighter device that uses a new Sharp print engine. The company simultaneously introduced its first QuickDraw-based color printer, the Phaser II SX, which users can upgrade to a Phaser II PX. The Phaser II SX is Tektronix's lowest-cost color printer ever at a suggested retail price of $4995; the price includes 1MB of RAM, expandable to 13MB. The Phaser II PX lists for $7995 and includes Adobe's Color PostScript, 35 fonts, and 6MB of RAM, expandable to 10MB.

The Phaser II SX uses the TekColor method of matching monitor colors with printer colors, while the II PX is certified compatible with the Pantone color-matching system. Both machines output 1 page per minute at 300 by 300 dpi on letter- or legal-size paper. The II SX can produce 16.7 million colors, while the II PX can produce an unlimited number of colors, according to Tektronix.

The Phaser II SX comes with SCSI and parallel connectors. The Phaser II PX includes SCSI, a parallel port, and an AppleTalk connector, and it can receive data from several systems simultaneously. When purchasing the II SX, the buyer chooses between a personality kit for the Macintosh or for Windows 3.0. Each kit includes the cable, instruction book, driver, and a copy of Freedom of Press publishing software for the appropriate personal computer. The II SX kit for the Mac includes a Chooser-level driver. For the Phaser II PX, Tektronix licensed Apple's LaserWriter driver and included HPGL capability for IBM PC–compatible systems.

At press time the II PX was slated to ship in January, with the II SX to follow in February. To upgrade from the II SX to the II PX, the user replaces the printer's main logic board. Tektronix expects the cost of the upgrade to be the difference between the prices of the two printers, about $3000. For the new printers Tektronix has extended its warranty from 90 days to one year. For more information, contact Tektronix in Wilsonville, Oregon, at 800/835-6100.—**T.M.**

Apple Announces Plug-and-Play Ethernet

In what may be the initial step toward faster built-in networking, Apple has introduced two new Ethernet add-in boards, one for the Mac LC and the other for NuBus-based Macs. The Ethernet LC Card and Ethernet NB Card attempt to make Ethernet networking more of a plug-and-play

(continues)

VIRUS WATCH

Current viruses, Trojan horses, and worms affecting the Macintosh community.

MODM and zero
Type: Viruses
First listed in Virus Watch: 3/91
Info: Both are nVIR B clones; infect applications and system files.
Impact: Nondestructive; can cause crashes.

ZUC B
Type: Virus
First listed in Virus Watch: 3/91
Info: A ZUC clone.
Impact: Nondestructive; infects applications and system files; renders cursor inoperable.

MDEF C
Type: Virus
First listed in Virus Watch: 2/91
Info: A Garfield strain; infects applications and system files.
Impact: Nondestructive; can cause crashes.

prod
Type: Virus
First listed in Virus Watch: 2/91
Info: An nVIR B clone; infects applications and system files.
Impact: Nondestructive; can cause crashes.

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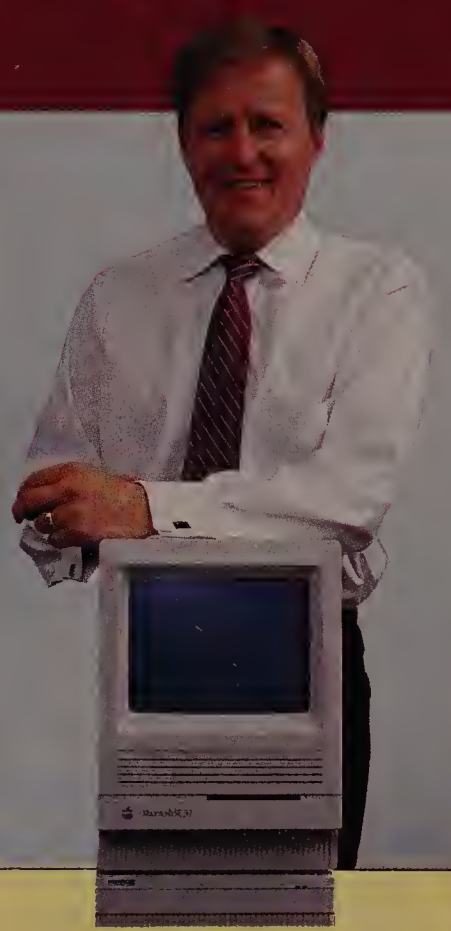

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Just as the competition was catching up, we made over 40 improvements to our M-series drives. We beefed up our cabinet, added features (see diagram below), radically updated our disk management utilities, and bundled award winning utilities from CE Software and Microlytics. We did all of this and still lowered our prices!

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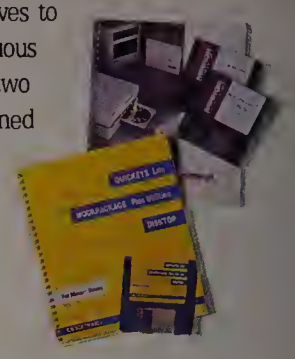

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VolumeBackup's sophisticated scripting feature lets you create custom backup procedures that automatically back up your data when it's most convenient (like when you sleep). Back up to floppies, tape, another drive, or a SyQuest cartridge.

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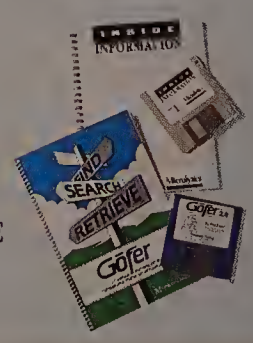
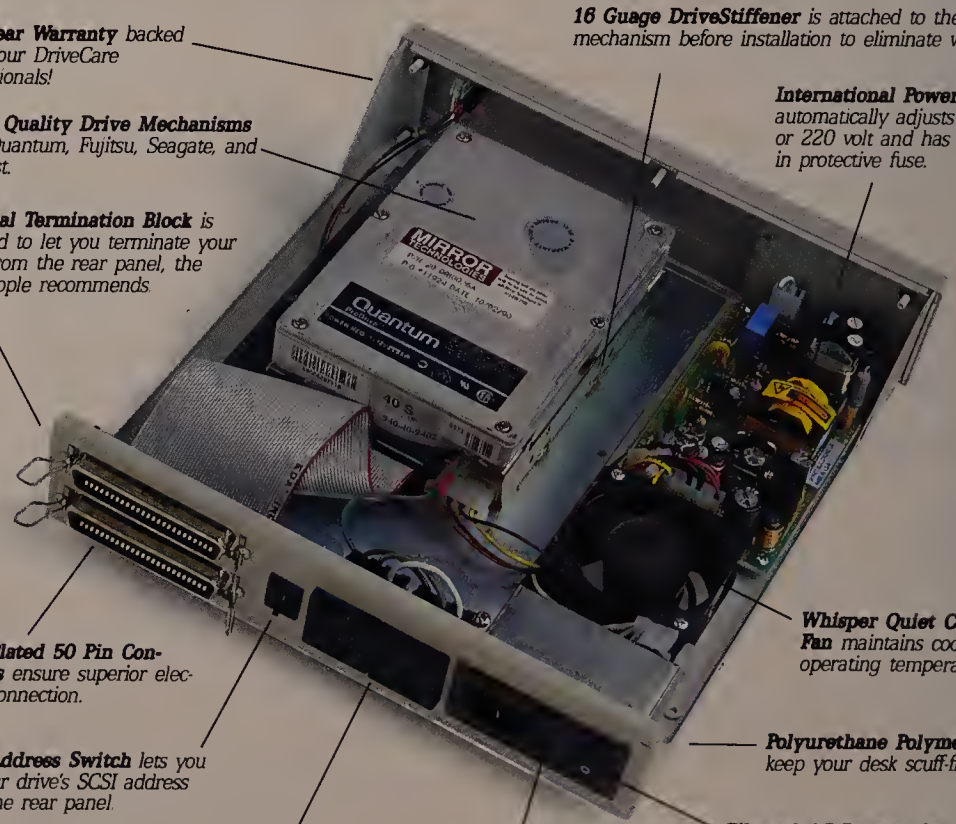
With every drive, we're including a collection of over a dozen CE Software utilities that includes QuicKeys Lite, DiskTop (v3.0.4), MockPackage, Aask, and Vaccine. And we've included Microlytic's GoFer, a high-speed text search and retrieval utility, and Inside Information, the first hierarchical dictionary for the Macintosh. Several of these wonderful utilities received MacUser Eddy awards and MacGuide Golden Gavel awards.



The Anatomy Of A Truly Great Drive.



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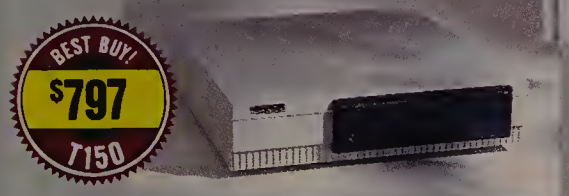

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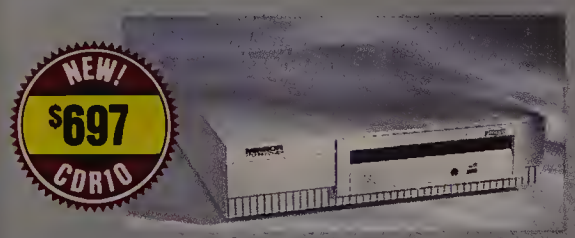

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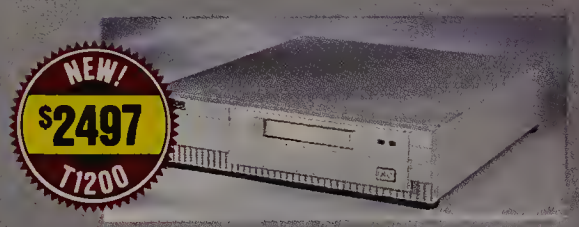

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MP80	80Mb	$567	$ 617
MP105	105Mb	$617	$ 667
M130	130Mb	$647	$ 747
M180	180Mb	$767	$ 877
M290	290Mb		$1647
M595	595Mb		$2247
RM42	45Mb		$ 617

MP designated a Quantum drive mechanism.

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LUIS DELGADO

Apple has introduced self-terminating Ethernet boards for the LC and Mac IIs, and a variety of transcievers and cables.

proposition for users by offering separate external transceivers for thin coaxial cable and unshielded twisted-pair (UTP) cable.

Both the Ethernet LC Card and Ethernet NB Card are self-terminating boards, making reconfiguration of an Ethernet network similar to LocalTalk network reconfiguration. Adding a Mac will not disrupt the network. Unlike the Ethernet LC Card, the Ethernet NB Card is based on the Macintosh Coprocessor Platform (MCP) and is an intelligent board that features its own 68000 microprocessor, memory, and multitasking operating system. Thus, it can offload network data transfer functions from the main Mac processor, allowing Macs to take greater advantage of Ethernet's data transfer rate (10 megabits per second). Apple's TokenTalk NB board, which allows a Macintosh to connect with IBM Token-Ring networks, is also based on MCP.

Transceivers attach to both boards via a proprietary interface called the Apple Attachment User Interface (AUI). According to Apple, the Apple AUI is designed to draw less power than conventional Ethernet AUIs, which may exceed Apple power recommendations. The Apple Ethernet Thin Coax Transceiver allows Macs to be connected to Ethernet networks created with thin coaxial cable, or 10Base 2. The Apple Ethernet Twisted Pair Transceiver enables users to link into Ethernet networks based on UTP telephone wiring, or 10BaseT. A third transceiver, the Apple Ethernet AUI Adapter, is an adapter that makes the new add-in boards compatible with Ethernet devices equipped with non-Apple AUIs. All three transceivers are compatible with the IEEE 802.3 specification. The Ethernet Thin Coax Transceiver is currently available; the UTP transceiver and AUI Adapter will be available in the second quarter.

Although third-party vendors already offer 10BaseT options for Macs, the Ethernet Twisted Pair Transceiver marks Apple's first venture into the medium. Apple's Macintosh II EtherTalk NB Card, to be discontinued, only offers coaxial-cable interfaces.

The Ethernet LC Card is $200 without a transciever, and at $375 with one transceiver. The Ethernet NB retails for $424 without a transceiver, and $599 with a transceiver. The three transceivers cost $175 if purchased separately. For more information, contact Apple at 408/996-1010.—**Brita Meng**

The 3-D Scratch Pad

Is anyone keeping count of the 3-D modeling packages that run on the Mac? They probably outnumber word processors, spreadsheets, and databases combined. Upfront is a new stripped-down 3-D modeler that—its publisher Alias says—can replace doodling.

Upfront's 3-D world has a single perspective window instead of the three abstract orthogonal views of most modelers, and the design palette provides a freehand sketch tool, five primitives (Upfront is splineless), and a cutting tool. As you draw, it guesses what edges you want to join or what surface you want to intersect.

Upfront lacks some obvious features but has subtle touches that other packages lack. For example, the sun is its only light source, but you can set it for any time of day, day of the year, and latitude. Upfront's object linking is primitive (its lack of animation capability makes linking less important), but you can compare and edit objects' attributes in a table environment. It has no text tools and provides only simple flat-shading, and must export to other programs to dimension or render. On the other hand, it has some amazing features: scan in a photograph, trace a perspective line, and Upfront overlays the scan with a live 3-D grid. If you cut a hole in a wall and cover it with a pane of glass, you can still select objects that are visible through the glass.

Alias plans more for the Mac—"a spline-based product, something with video, our own rendering technology, and an interface to standards like RenderMan," says one Alias engineer.

Upfront lists for $895. For more information, call Alias's Style division in Toronto at 416/362-9181.—**D.L.**

After you trace over a few perspective lines in an illustration or scanned photograph, Upfront understands the image's geometry and helps you use it as a 3-D template.

How to recycle your Macworld Magazine.

Pass it on.

Protecting the environment is one of the most important issues facing the 1990's.

The Macworld Earth Conservancy, developed by Macworld employees, continually explores ways to conserve our resources.

We've instituted conservation measures and a comprehensive recycling program.

Our concern for the environment has directly affected the production of Macworld Magazine.

We are continually exploring alternatives to our printing process and the latest breakthroughs in printing inks and recycled paper.

But until the tools are in place to recycle old Macworlds into new ones, we have a suggestion.

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Any of these ideas will help minimize the waste of our resources and give us hope for the future.

MACWORLD

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A MacWarehouse Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable overnight service will have your Kit in your hands tomorrow!

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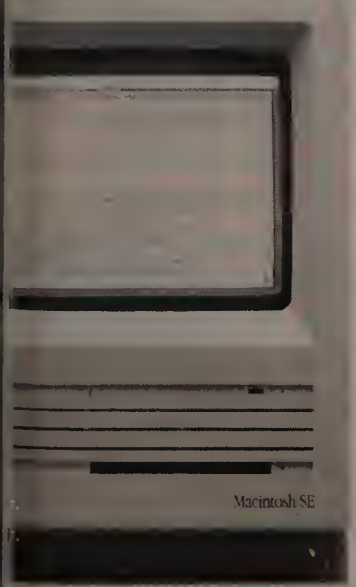
Never again will you have to quit your word processor just to answer a question about a spread-sheet. Install extra memory and you can leave your letter open while you refer to last month's sales figures. You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION

Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMS. Our FREE video will give you STEP-BY-STEP installation instructions. Every type of Mac is covered and we think we've made it a breeze.

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs - (2 @ $59 ea.).



The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory.	Do this: (Install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1 MB SIMMs, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256K SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four 256K SIMMs with four 1 MB SIMMs.
To upgrade an 8-socket Mac II, IIx, IIcx, oe SE 30 to this amount of memory.	**Do this: (Install in multiples of four only.)**
4 MB	Remove all four existing 256K SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1 MB in remaining sockets.
8 MB	Remove all four 256K SIMMs, install eight 1 MB SIMMs.

To open your Mac Plus or SE, you'll need a specially designed tool - it's available from us as part of a handy tool kit for just $9.

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Memory chips come factory-installed on plug-in cards, called SIMMS (Single Inline Memory Modules). Each one megabyte SIMMS card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung. We also carry the full line of Dove memory products.
Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 100ns SIMMs is $59. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor reads 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

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ONE YEAR WARRANTY. MacWarehouse also guarantees its Memory Kits against manufacturer defects for one year from the date of purchase. We will repair the item or replace it at our discretion.

* SIMMs prices vary. Call for latest information.
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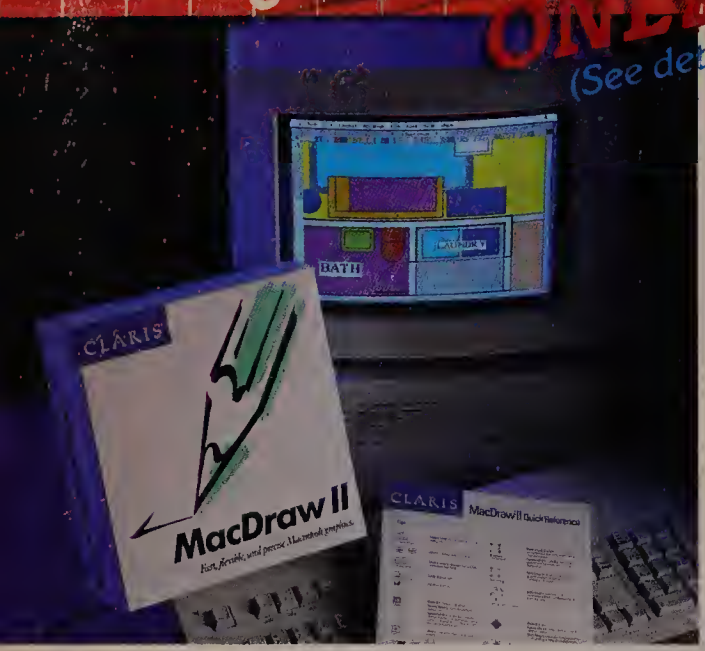

MacDraw II 1.1 (Claris)
Create a variety of graphics in addition to regular drawings. Use it for simple Desktop Publishing projects (flyers, invitations, business forms). Create illustrations, logos, and maps. Or design floor plans, landscapes, and products. MacDraw II prints everything from E size documents to color 35mm slides, and generates four-color separations. Comes with FREE MacPaint 2.0 and custom clip art. Also, FREE upgrade to MacDraw Pro. A $349 value.
GRA 0118 $289.

Smart Alarms 3.0 & Appointments Diary 3.1 (JAM Software)
Let Smart Alarms and Appointment Diary take care of your daily schedule. Just enter your appointments into the diary, and let Smart Alarms remind you of the important events. With the Auto layout function, you can create custom diaries that display information in the format you prefer. New features include automatic backup, a snooze button, the ability to turn off alarms while using specified application (such as modem software), and a choice of beep options. Multi-User versions are compatible with LocalTalk, MacServe, TOPS, allShare, PSN and Apple Share.
Single User: **DAC 0032 $64.**
1-4 Users **DAC 0033 $125.**
5-8 Users **DAC 0034 $189.**

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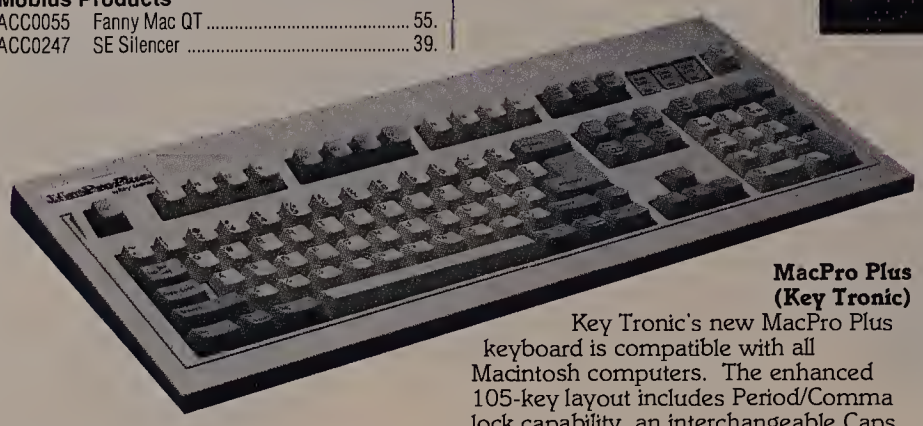
American Power Conversion
ACC0411 110 SE UPS ..... 219.
ACC0458 200DL UPS ..... 159.
ACC0451 370ci UPS ..... 399.
ACC0453 450AT UPS ..... 349.
ACC0454 520ES UPS ..... 419.
Apple
ACC0336 Toner Cartridge - LaserWriter II ..... 105.
Basic Needs, Inc.
ACC0356 Dust Cover - Mac II & Extended Keyboard (grey nylon) ..... 12.
ACC0348 HardTops ImageWriter II Cover ..... 16.
ACC0347 HardTops Mac Extended Keyboard Cover 15.
ACC0345 HardTops Mac Plus Keyboard Cover ..... 15.
ACC0346 HardTops Mac Standard Keyboard Cover 15.
ACC0466 MacIIcx/ci Monitor Stand ..... 47.
ACC0351 Utility Pac ..... 11.
B.A.S.F. (BASF)
MED0030 Disks - DS/HD 1.44 Meg (box of 10) ..... 22.
MED0041 Disks - Preformatted DS/DD (box of 10) .. 14.
MED0040 Disks - Preformatted DS/HD (box of 10) .. 25.
MED0029 Disks - DS/DD (box of 10) ..... 12.
Curtis
ACC0469 Command Center ..... 89.
Ergotron
ACC0344 MacTilt II - 13" Color RGB ..... 75.
ACC0128 MacTilt Plus/512 - Platinum ..... 68.
ACC0009 MacTilt SE, SE/030 - Platinum ..... 68.
I/O Design, Inc.
ACC0028 MacLuggage Plus Carrying Case ..... 64.
ACC1070 MacLuggage SE Carrying Case ..... 75.
ACC0427 Ultimate SE Carrying Case - Black ..... 79.
ACC0440 Ultimate SE Carrying Case - Navy ..... 79.
Ultimate SE/Plus Neon Carry Cases .... ea.89.
Kensington
ACC0459 Maccessories SE Radiation Anti-Glare Filter ..... 52.
ACC0097 System Saver Mac - Platinum ..... 63.
Mobius Products
ACC0055 Fanny Mac QT ..... 55.
ACC0247 SE Silencer ..... 39.
PowerUser™
BND0013 PowerUser Carrying Case w/Free Cap ..... 69.
Sony
MED0031 Disks - 1.44 Mb High Density (3.5) ..... 24.
MED0003 Disks - DS/DD (box of 10) ..... 13.
Targus, Ltd.
ACC0251 Imagewriter II Carry Case (black) ..... 45.
ACC0438 MacIIcx/ci Carrying Case - Black ..... 75.
ACC0252 MacPlus/SE Carrying Case (black) ..... 55.
ACC0250 MacPlus/SE- Ext Keyboard Carrying Case 69.
ACC0482 Premier Leather Case ..... 175.



MacPro Plus (Key Tronic)
Key Tronic's new MacPro Plus keyboard is compatible with all Macintosh computers. The enhanced 105-key layout includes Period/Comma lock capability, an interchangeable Caps Lock and Ctrl keys. Also, the connecting cable you need is offered at no extra charge. The keyboard is backed by a three-year warranty and unlimited toll-free product support. Includes offer for Tempo II, a keyboard macro package from Affinity Microsystems a $149.95 value FREE! **INP 0083 $118.**

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Aatrix Software
FIN0050 Checkwriter II 3.1 ..... 32.
FIN0041 Payroll 3.5 ..... 109.
FIN0113 Ultimate Payroll ..... 189.
Absolute Solutions, Inc.
FIN0086 Computerized Classic Accounting ..... 225.
Checkfree Corporation
FIN0088 CheckFree ..... 21.
ChipSoft
FIN0114 TurboTax Personal 1040 ..... 50.
Computer Associates
FIN0044 ACC PAC Bedford Simply Accounting 1.1 ..... 225.
Inman
FIN0013 Business Sense 1.3 ..... 129.
Intuit
FIN0043 Quicken 1.5 ..... 35.
Meca
FIN0039 Andrew Tobias' Managing Your Money 3.0 ..... 135.
Nolo Press
BUS0133 For The Record 2.0 ..... 31.
BUS0132 WillMaker 4.0 ..... 37.
Peachtree
FIN0059 At Once! ..... 285.
Reality Technologies
FIN0068 WealthBuilder (Mac) ..... 145.
Softsync/BLOC Publishing
FIN0048 Accountant Inc. Professional ..... 345.
Softview
FIN0090 if:X Personal Tax Analyst ..... 59.
FIN0097 MacInTax 1040 - 90 ..... 59.
Teleware, Inc.
FIN0087 M.Y.O.B. 2.0 ..... 145.

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BUS0086 ResumExpert Cover Letters ..... 49.
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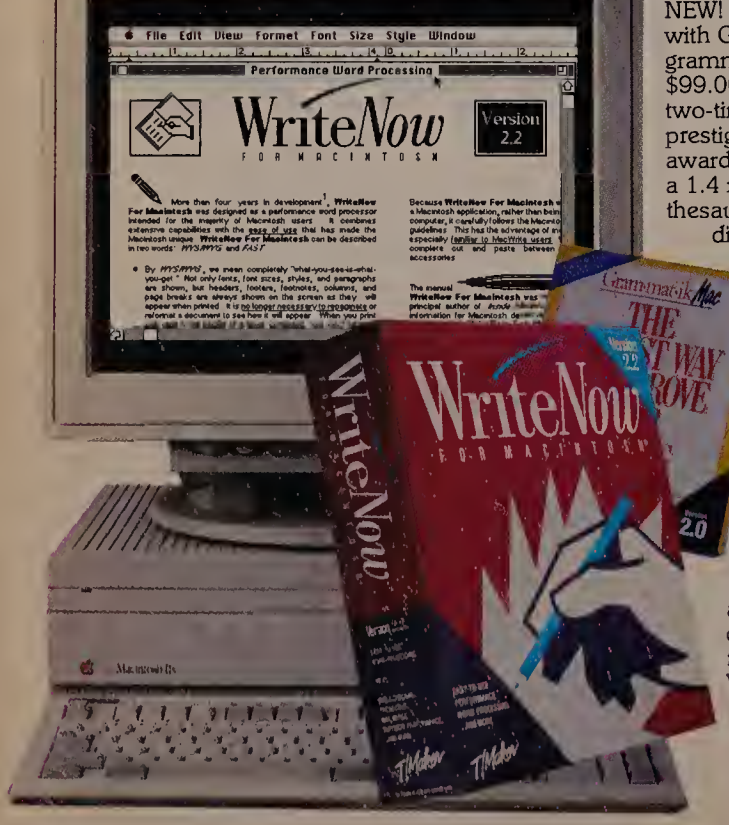
BUS0087 ResumExpert (Word 3.0/4.0 version) ..... 49.
Abacus Concepts
STA0008 StatView II 1.03 ..... 279.
STA0010 StatView SE+Graphics 1.03 ..... 179.



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STA0023 SuperANOVA (Mac Plus, SE, Portable) .. 309.
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BUS0131 Cheshire 1.0 ..... 63.

Acius
DAT0045 4th Dimension 2.1 ..... 489.

AEC Management Systems
BUS0129 FastTrack Schedule 1.5 ..... 139.
DAT0055 AEC Information Manager ..... 409.

Aldus
BUS0066 Persuasion 2.0 ..... 329.

ASD Software, Inc.
BUS0134 Planisoft ..... 199.
BUS0146 Planisoft - 5 pack ..... 579.
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Ashton-Tate
DAT0042 dBase Mac ..... **SPECIAL! 59.**
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ACC0489 MacLabelPro ..... 49.

Baseline Publishing
BUS0149 1 Shot Worksheet ..... 59.

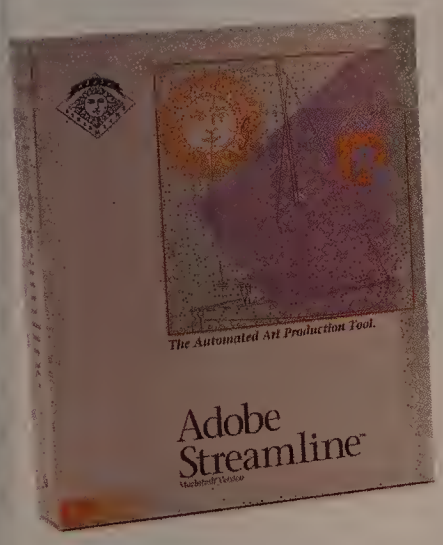
Casady & Greene, Inc
DAC0010 QuickDex ..... 34.

CE Software
BUS0135 Alarming Events ..... 85.
GRA0070 CalendarMaker 3.0 ..... 31.

Claris
DAT0064 FileMaker Pro ..... 218.
BUS0058 MacProject II 2.1 ..... 365.
BUS0065 SmartForm Designer ..... 289.

DeltaPoint, Inc.
BUS0099 DeltaGraph 1.5 ..... 109.

Fox Software
DAT0047 FoxBase+/Mac 2.0 ..... 292.



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GRA 0125 $119.

Informix
BUS0064 WingZ 1.1 ..... 245.

JAM Software
DAC0033 Smart Alarms 3.0 (1-4 users) ..... 125.
DAC0034 Smart Alarms 3.0 (5-8 users) ..... 189.
DAC0032 Smart Alarms 3.0 (Single User) ..... 64.

Kaetron
BUS0100 TopDown 2.0 ..... 229.

Mainstay
GRA0100 MacSchedule 2.5 ..... 139.
GRA0237 MacSchedule PLUS ..... 215.

Microlytics
DAC0031 Inside Information ..... 69.

Microsoft
BUS0003 Excel 2.2 ..... 245.
BUS0008 PowerPoint 2.01 ..... 245.
BUS0088 The Microsoft Office ..... 529.
BUS0014 Works 2.0 ..... 179.

Portfolio Systems
BUS0101 Dynodex - The Instant Address Book ..... 75.
DTP0055 DynoPage ..... 57.

110SE UPS and PowerChute for AppleShare (American Power Conversion)
110SE UPS
Fits neatly under your Mac and provides up to twenty minutes of clean power. Its built-in rechargeable battery prevents data loss and equipment damage during momentary outages and brownouts. During normal operation, it protects against surges, spikes and power line noise. **ACC 0411 $219.**

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BUS0096 Address Book Plus ..... 52.
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BUS0121 FastForms 2.0 ..... 105.

Round Lake Publishing
BOK0007 LetterWorks ..... 59.

Satori
BUS0025 Bulk Mailer 3.2.5 ..... 75.

Softview (Full line available)
BUS0139 if:X Business Expense Reports ..... 49.
BUS0141 if:X DOD Expense Reports ..... 49.
BUS0138 if:X Forms Designer ..... 175.
BUS0142 if:X GSA Expense Reports ..... 49.

Symantec Corporation
BUS0055 More 3.0 ..... 265.

Symmetry
BUS0075 KeyPlan ..... 245.

Synex
BUS0120 MacEnvelope Plus 2.0 ..... 159.

Timeslips
BUS0043 Timeslips III 2.0 ..... 195.

T/Maker
BUS0152 SmartBundle ..... 215.

Vertical Solutions
BUS0113 FastEnvelope ..... 45.
BUS0105 FastLabel 2.0 ..... 45.

Wolfram Research, Inc.
STA0013 Mathematica (SE) ..... 449.

Zedcor
BUS0118 DESK 3.03 ..... 229.

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CDR0006 EDUCORP CD-ROM 4.0 ..... 159.
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EDU0198 Lingua-ROM ..... 399.

Wayzata Technology
EDU0194 The World Fact Book ..... 79.

NEC
CDR0002 NEC Interface Kit ..... 72.
GRA0212 Photo Gallery ..... 246.
CDR0001 Intersect CDR-35 Reader ..... 399.

Microsoft
BUS0019 The Microsoft Office CD-ROM ..... 599.

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Caravelle Networks Corporation
NET0100 Mac to Mac - 10 pack ..... 229.
NET 0099 Mac to Mac - 5 pack ..... 165.
NET0101 Mac to Mac - 50 pack ..... 979.

CE Software
COM0054 In/Out (5 user Pak) ..... 128.
COM0041 QuickMail 2.2 (1 - 10 users) ..... 315.

CompuServe
COM0040 Navigator 3.0 ..... 49.

DataViz
COM0001 MacLink Plus / PC 4.5 ..... 117.
COM0052 MacLink Plus / Translators 4.5 ..... 98.

Dayna Communications, Inc.
UTI0116 DOS Mounter ..... 55.

Farallon™ Computing
COM0078 Liaison 3.0 ..... 267.
NET0005 PhoneNET® 128/512 ..... 35.
NET0084 PhoneNET® Manager's Pack ..... 669.
NET0007 PhoneNET® Plus, SE & II ..... 33.
NET0040 PhoneNET® Plus, SE & II - 10 Pack ..... 219.
NET0019 PhoneNET StarController® ..... 825.
NET0059 StarController™EN (EtherNet) ..... 1629.
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NET0038 Timbuktu® 3.1 ..... 95.
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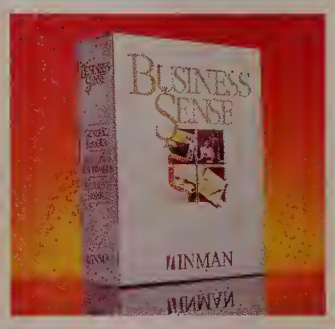
Communications software includes a reworked user interface with completely reorganized menus and enhanced terminal support including support for the VT-102. Get a free subscription to GEnie and a free copy of Okyto with each copy of White Knight.
COM 0060 $85.



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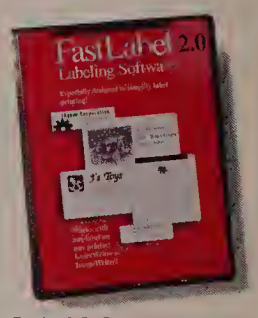

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The Only V.32 Data Modem with fax capability. A 9600 Data Modem/9600 Send/Receive Group III Fax. Supports MNP-5 and V.42 error correction/MNP-5 data compression. Includes MAcKNOWLEDGE™ software, fax software with many exclusive features, including grey scale support; plus a Mac cable. **MOD 0052 $699.**

FreeSoft
COM0060 White Knight 11 ..... 85.
Insignia
UTI0174 AccessPC ..... 65.
COM0063 Soft PC AT/EGA Module ..... 125.
COM0045 SoftPC 1.3 ..... 245.
International Business Software
NET0097 DataClub - 3 Pack ..... 199.
NET0098 DataClub - 10 Pack ..... 559.
Microcom
NET0041 Carbon Copy Mac - single ..... 117.
NET0088 Carbon Copy Mac - twin ..... 189.
Prodigy
COM0056 Prodigy Starter Kit for the Mac ..... 27.
Sitka
NET0056 InBox Plus 3.0 ..... 1299.
NET0057 DOSTOPS 3.0 ..... 165.
NET0049 MACTOPS 3.0 ..... 187.
Software Ventures
COM0043 Microphone II 3.0 ..... 215.
Traveling Software
NET0045 Lap-Link III - Connectivity Pac ..... 99.

DESKTOP PUBLISHING

Aldus
DTP0056 Design Team ..... 889.
DTP0045 PageMaker 4.0 ..... 499.
DTP0047 PrePrint ..... 329.
Letraset
FON0086 LetraStudio ..... 275.
Multi Ad Services
DTP0042 Multi Ad Creator 2.21 ..... 799.
Quark, Inc.
DTP0028 QuarkStyle ..... 189.
DTP0049 XPress 3.0 ..... 529.
Silicon Beach
DTP0040 Personal Press ..... 199.
TimeWorks
DTP0048 Publish It! Easy 2.0 ..... 145.

DISK DRIVES & BOARDS

Applied Engineering
DRI0287 AE HD Mac Drive ..... 245.
INP0148 QuadraLink ..... 215.
Computer Friends
GRA0251 ColorSnap 32 Plus ..... 649.
Cutting Edge
DRI0042 800K Floppy Disk Drive ..... 149.
DRI0157 20 meg Under the Mac Drive ..... 339.
DRI0158 30+ meg Under the Mac Drive ..... 399.
DRI0162 45 Mb Removable Hard Drive (Syquest) 699.
DRI0159 45+ meg Under the Mac Drive ..... 449.
DRI0160 60+ meg Under the Mac Drive ..... 489.
DRI0161 80+ meg Under the Mac Drive ..... 539.
Dayna Communications, Inc.
DRI0174 DaynaFile dual 360K (5.25) & 1.44 (3.5) 749.
DRI0104 DaynaFile single 360K (5 1/4) ..... 525.
Fujitsu
DRI0186 800K Disk Drive - Fujitsu ..... 99.
Kennect Technology
DRI0218 Drive 1200 ..... 259.
DRI0141 Drive 2.4 ..... 329.
DRI0219 Drive 360 (5.25 in. floppy disk drive) ..... 259.
DRI0140 Rapport ..... 199.
Mass MicroSystems
DRI0256 DataPak MO 512 MB Read-write/optical ..... 3565.
GRA0243 QuickImage 24 Video Frame Grabber - II 749.
Micron Technology
DRI0187 Xceed 8-bit Video Card NB6-48 ..... 349.
DRI0236 Xceed IIci - 128 Cache Card ..... 275.
MicroTech International, Inc.
DRI0294 Athena A100 100 Meg Drive ..... 899.
DRI0293 Athena A50 50 Meg Drive ..... 599.
DRI0311 Europa 100 Meg Drive ..... 739.
DRI0308 Europa 20 Meg Drive ..... 379.

Kurta IS/ADB Graphics Tablets (Kurta)
A 200 dpi tablet that provides absolute positioning control, so you can create graphics quickly and easily. Its Menu Strip gives you 11 to 23 instant commands or macros. Its especially ideal for sketching, drafting, or freeform drawing. The Kurta Tablets work with most large screen monitors. Each tablet comes complete with the Cordless Cursor and Cordless Pen for maximum flexibility and convenience.
8.5x11 INP 0113 $319.
12x12 INP 0114 $385.
12x17 INP 0115 $625.

DRI0309 Europa 40 Meg Drive ..... 419.
DRI0310 Europa 80 Meg Drive ..... 599.
DRI0307 MicroTech R50 50 Meg Removable ..... 979.
DRI0304 Nova N40 40 Meg Drive ..... 565.
DRI0305 Nova N80 80 Meg Drive ..... 745.
Optical Access International
DRI0251 Access CD ..... 849.
DRI0252 Access MF ..... 3995.
MED0036 Access MF Rewritable Optical Cartridge 239.
Peripheral Land, Inc.
DRI0193 Infinity Dual 40Mb Removable ..... 1875.
DRI0115 Infinity Turbo 40 Meg Removable ..... 799.
DRI0154 Turbo Floppy 1.4 Drive ..... 359.
PowerUser™
DRI0201 20 Meg External Hard Drive ..... 329.

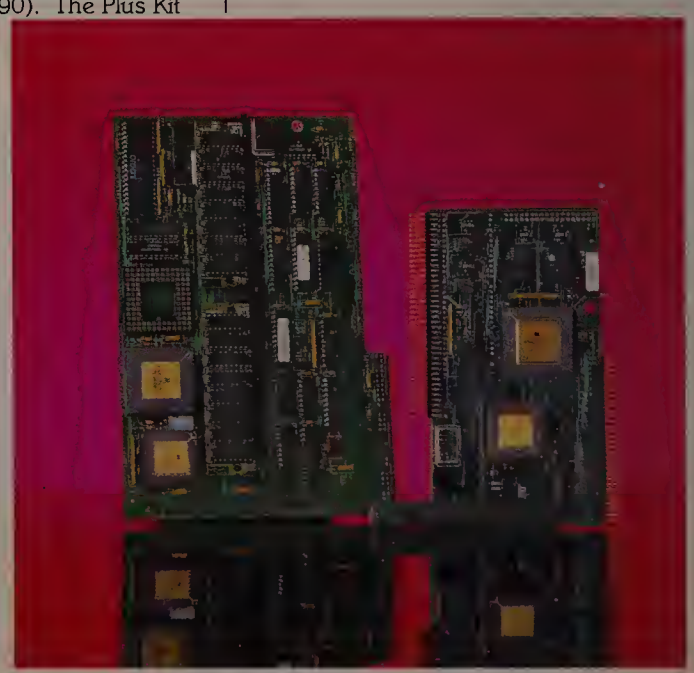
Timeslips III 2.0 (TimeSlips Corp.)
Timeslips III is a complete time keeping and billing package for people whose stock in trade is their time. You gather time data with the TS Timer DA. When the time comes to send the bill, TS Report will extract the data and generate invoices and reports in a wide variety of formats. And Timeslips can handle the big jobs: 250 users, 250 different activities, and over 3,000 clients, with up to 128 projects per client. **BUS 0043 $195**

DRI0202 30 Meg External Hard Drive ..... 369.
DRI0206 44 Meg Removable ..... 689.
DRI0203 45 Meg External Hard Drive ..... 419.
DRI0204 60 Meg External Hard Drive ..... 469.
DRI0205 80 Meg External Hard Drive ..... 519.

EDUCATIONAL & INSTRUCTIONAL

Beacon Technology, Inc.
HYP0034 HyperBible International Version 2.0 ..... 129.
HYP0035 HyperBible King James Version 2.0 ..... 129.

Gemini and Mercury Accelerators (Total Systems)
Premium Gemini Accelerators will let your Mac SE outperform a IIci! Recommended by both MacUser and MacWorld (August 1990). The Plus Kit adapts the board to a Plus, 512KE, even an old 128KE. Optional math coprocessor speeds up math functions. The new value priced Mercury line provides System 7 without a dead end! Modular design allows the addition of expansion modules. Coupon included for FREE copy of VIRTUAL. Full line available.
Mercury/Plus DRI 0295 $519.
Mercury/SE DRI 0297 $389.
Gemini 20MHz DRI 0301 $799.
Gemini 25MHz DRI 0302 $1039.
Plus Kit DRI 0265 $129.



Broderbund
EDU0170 The Playroom ..... 29.
Davidson & Associates
EDU0037 Math Blaster ..... 29.
EDU0118 Math Blaster Mystery ..... 29.
Help Software, Inc.
EDU0108 Desktop Help for Excel ..... 52.
HyperGlot Software Company
Pronunciation Tutor w/ Sound: Chinese, French, German or Spanish . ea. 39.
Tense Tutor: French, German, Spanish or Italian ..... ea. 39.
Verb Tutor w/ Sound: French, German, Spanish or Italian ..... ea. 39.
Word Torture: French, German, Italian, Russian or Spanish ..... ea. 29.
EDU0246 Easy Kana - Japanese ..... 129.
EDU0188 KanjiMaster ..... 105.
EDU0245 RefBase ..... 105.
EDU0178 Russian - Verbal Aspect ..... 42.
Learning Company
EDU0084 Math Rabbit ..... 30.
EDU0048 Reader Rabbit 2.0 ..... 30.
MicroMaps
GRA0229 MapArt PICT Format ..... 99.
GRA0228 MapArt EPS Format ..... 99.
Nordic Software
EDU0142 MacKids Preschool Pack ..... 36.
Penton Overseas (Full line available)
VocabuLearn Level I or II: French, German, Italian, Japanese, Russian or Spanish ea. 35.
Visionary Software
EDU0207 LifeGuard ..... 49.
EDU0209 Synchronicity 2.5 ..... 49.
Voice & Video
Getting Started Video: Excel 2.2, PageMaker 4.0, Word 4.0 ..... ea. 39.
Advanced Techniques Video: Excel 2.2, PageMaker 4.0, Word 4.0 ..... ea. 39.
EDU0063 HyperCard Getting Started Video ..... 39.
Zondervan Publishing House
BOK0022 MacBible - Greek ..... 99.
BOK0021 MacBible - King James Version ..... 59.
BOK0020 MacBible - New International Version ..... 59.

ENTERTAINMENT

Artworx
ENT0303 Bridge 6.0 ..... 29.

FREE!

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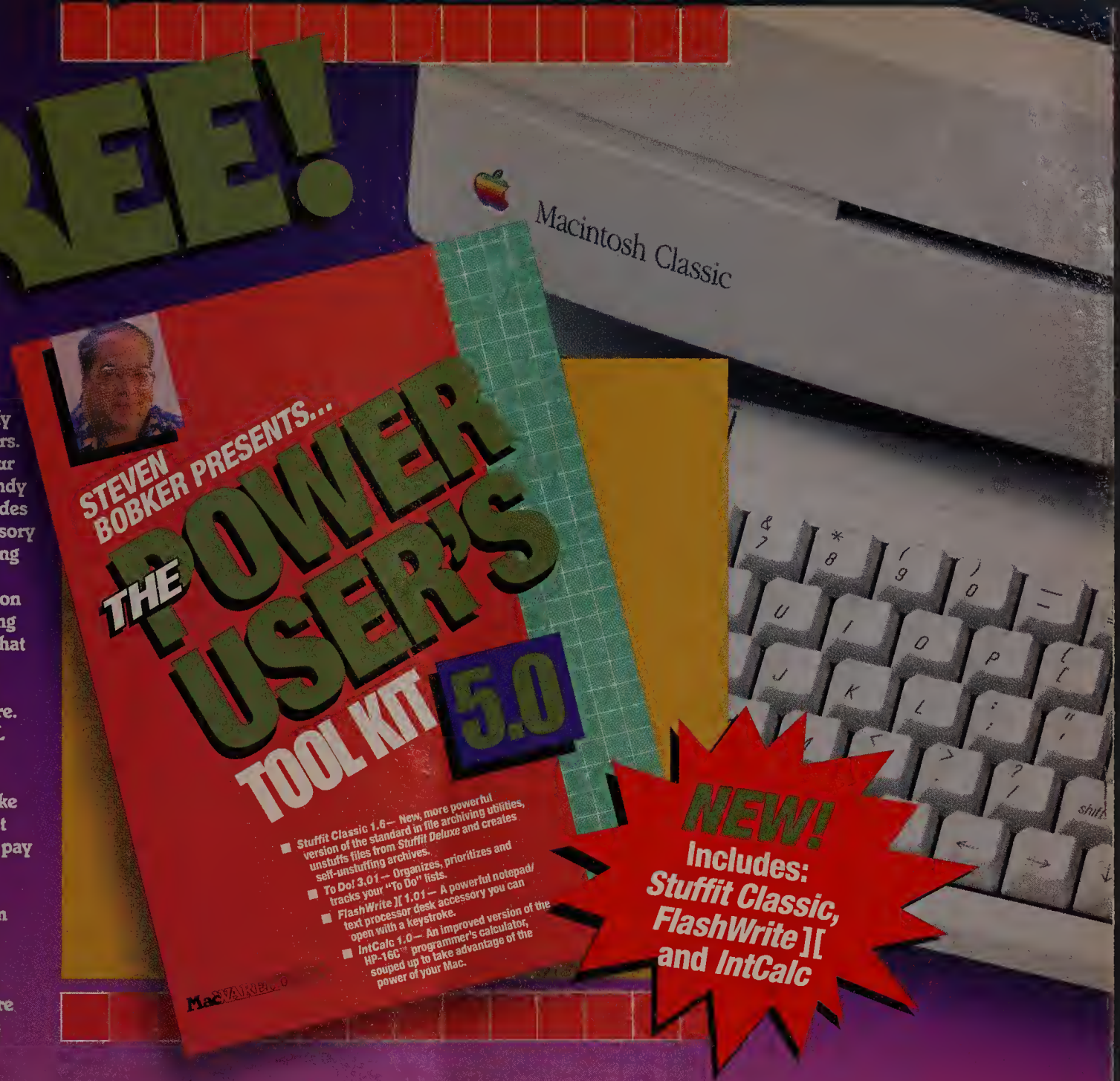

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Freedom of Press Light 3.0 (Custom Applications)
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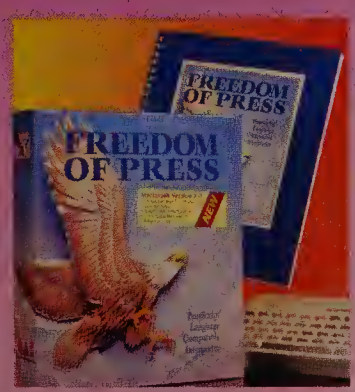
Freedom of Press 3.0
Includes 35 fonts, supports more than 50 black and white and color printers.
UTI 0136 $255.



The "ULTIMATE" SE Carrying Case (I/O Design, Inc.)
The "ULTIMATE" SE Carrying Case is designed with the same high quality standards as other MacLuggage products. This case offers internal, padded compartments for ANY Macintosh keyboard, mouse, external hard disk and cables also holds the new Macintosh Classic. It also features 2 additional exterior pockets for everything from disks to umbrellas. Combine these features with sturdy Dupont Cordura nylon and 1/2 inch high density foam padding and you'll see why this is the "Ultimate" carrying case for your Mac. Available in black (**ACC 0427**) and navy blue (**ACC 0440**). **$79.**

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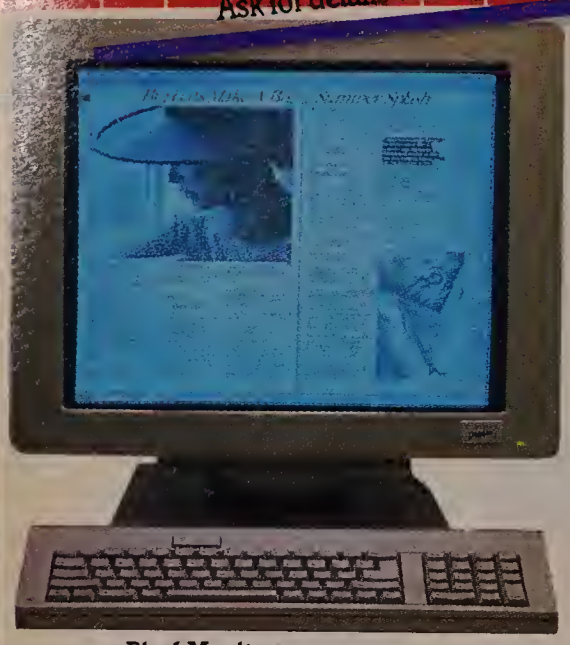
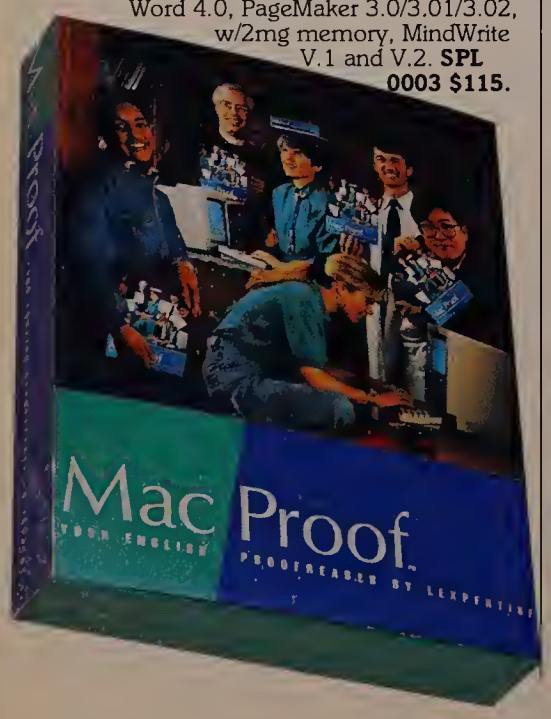


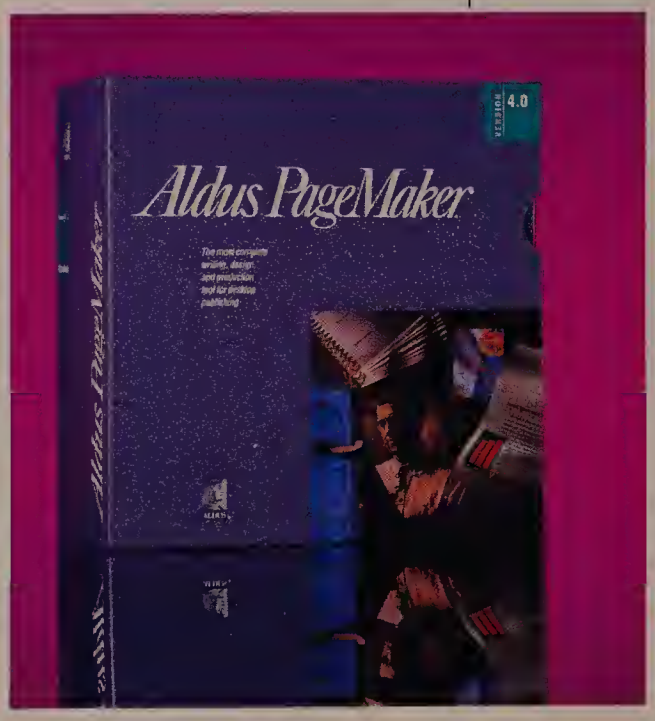
Rival Monitors (MegaGraphics Display System)
MegaGraphics Large Screen Monitor Systems include both the interface card and the monitor. Choose monochrome, gray scale, 8 or 24-bit color. All monitors include an ergonomically designed tilt/swivel stand. The systems operate at a high refresh rate (69 to 75 Hz) to deliver a stable, flicker-free image, with a 75 dpi resolution (1024 X 826 pixels). All come with the manufacturer's one-year warranty (extended warranties available through the manufacturer at extra cost). **Starting at $1269.**

Baseline Publishing
ENT0351 Talking Moose ..... 23.
Broderbund
ENT0259 Shufflepuck Cafe ..... 25.
Where is Carmen Sandiego? ..... ea. 29.
Bulls City Software
ENT0308 Moriarity's Revenge ..... 35.
Bullseye
ENT0045 Ferrari Grand Prix 1.6 ..... 31.
ENT0046 Fokker Triplane Flight Simulator 2.8 ..... 23.
ENT0261 P51 Mustang 2.80 ..... 35.
Centron Software, Inc.
ENT0329 BlackJack Strategy Tester (w/ BlackJack Ace) ..... 65.

MacProof 3.2.1 (Lexpertise)
You'll never get a second chance to make a first impression! MacProof 3.2.1 is your English proofreader. Without leaving your document, it proofreads all text written on your word processor: business, educational, personal and professional. MacProof is a desk accessory for the Macintosh Plus, SE, II and IIcx. It checks mechanics, word usage, writing style and structure. You can customize the usage and spelling dictionaries to your specific requirements. Compatible with MacWrite II V. 1.0, MacWrite V. 4.6 & 5.0, Microsoft Word 4.0, PageMaker 3.0/3.01/3.02, w/2mg memory, MindWrite V.1 and V.2. **SPL 0003 $115.**



ENT0257 CrapsMaster ..... 27.
ENT0264 BlackJack Ace ..... 27.
ENT0289 CasinoMaster Deluxe Mac II Version ..... 55.
ENT0277 CasinoMaster (Plus/SE) ..... 49.
Electronic Arts
ENT0355 Harpoon ..... 39.
ENT0319 Starflight ..... 39.
Sir Tech Software, Inc.
ENT0096 Wizardry ..... 25.
ENT0347 Wizardry II: Knight of Diamonds ..... 29.
Spectrum HoloByte
ENT0344 FACES ..... 25.
ENT0252 TETRIS ..... 25.
ENT0328 Welltris ..... 25.
The Software Toolworks
ENT0281 Chessmaster 2100 ..... 32.
ENT0278 Life & Death ..... 32.
ENT0269 The Hunt For Red October ..... 20.
Three-Sixty
ENT0323 Sands of Fire ..... 32.
Toyogo
ENT0270 Go Master 4.7 ..... 45.
ENT0326 Nemesis Deluxe ..... 99.
XOR Corporation
ENT0274 MacGolf Classic ..... 52.
ENT0330 MacSki ..... 40.
ENT0212 NFL Challenge ..... 55.



Aldus PageMaker 4.0 (Aldus)
Offers significant improvements in every area from the User Interface, Page Composition, Document Formatting, Text Handling, Typography, Graphics and Color, to Printing. The Story Editor has complete word processing capabilities, including search and replace by characters, fonts, point sizes, or paragraph styles, and a spelling checker with hyphenation. New typographic controls improve page appearance. Handles book length documents, generates tables of contents and links graphic elements with related text. **DTP 0045 $499.**

FONTS & APPPLICATIONS

Adobe Systems, Inc.
FON0264 Adobe Type Manager 2.0 ..... 55.
FON0278 Adobe Type Manager Plus Pack ..... 109.
Adobe Type Set 1 or 2 ..... ea. 58.
FON0326 Adobe Type Set 3 ..... 129.
Smart Art I, II, III or IV ..... ea. 59.
DAC0028 TypeAlign ..... 59.
FON0295 Adobe Type Reunion ..... 38.
Altsys
FON0183 Art Importer 2.0 ..... 95.
FON0014 Fontographer 3.2 ..... 275.
FON0284 Metamorphosis 1.5 ..... 95.
Broderbund
GRA0156 TypeStyler ..... 119.
Dubl-Click
FON0081 MenuFonts 3.0 ..... 31.
Pacific Data Products
INP0138 Pacific MacPage ..... 425.

Color MacCheese, INIT Manager and 1 Shot Worksheet (Baseline)
Color MacCheese
The first 32 bit color paint program for the starving artist. Features the advanced tools and effects found in high cost programs. As well as an extensive context sensitive help system. **GRA 0242 $59.**
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Take control of startup documents before they load. Save sets of INITs, disable INITs, control statup icons, and generate reports. Includes a Damage Control feature to prevent recurring crashes. **UTI 0187 $35.**
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Ideal for estimating, proposals, and amoritzation schedules. Combines a powerful forms generator and the mathematical capabilites of a spreadsheet to save time and money. **BUS 0149 $59.**

QMS
UTI0169 UltraScript ..... 119.
Tactic Software
FON0265 ArtFonts ..... 50.
TeleTypesetting
FON0343 T-Script ..... 92.
FON0357 T-Script Basic ..... 55.

GRAPHICS & MULTIMEDIA

3G Graphics
GRA0188 Images with Impact! Accents & Borders 1 65.
GRA0111 Images with Impact! Business 1 ..... 65.
GRA0089 Images with Impact! Graphics ..... 50.
Adobe Systems, Inc.
DTP0054 Illustrator 3.0 (w/ ATM 2.0) ..... 349.
GRA0125 Streamline ..... 119.
GRA0191 PhotoShop ..... 499.
Aldus
GRA0090 Freehand 2.02 ..... 329.
Baseline Publishing
GRA0242 Color MacCHEESE ..... 59.
Bright Star Tech, Inc.
GRA0161 interFACE ..... 249.
Claris
CAD0029 ClarisCAD 2.0 ..... 649.
GRA0118 MacDraw II ..... 289.
GRA0117 MacPaint 2.0 ..... 92.

Creative Software
GRA0240 Easy Color Paint 2.0 ..... 47.
Deneba Software
GRA0075 Canvas 2.1 ..... 189.
GRA0187 UltraPaint ..... 125.
Dream Maker
GRA0105 Cliptures Vol 1 Business Images ..... 69.
GRA0124 Cliptures Vol 2 Business Images ..... 69.
GRA0219 Cliptures Vol 3 Sports ..... 69.
GRA0101 MacGallery (Hypercard version) ..... 27.
GRA0102 MacGallery (MacPaint version) ..... 27.
Electronic Arts
GRA0106 Studio/8 ..... 189.
GRA0231 Studio/32 ..... 449.
Farallon™ Computing
GRA0221 MediaTracks™ ..... 189.
GRA0222 MediaTracks™ Multimedia Pack ..... 319.
Graphsoft
CAD0024 Blueprint ..... 219.
CAD0030 MiniCAD+ 3.0 ..... 595.
Innovative Data Design
CAD0028 MacDraft 2.0 ..... 193.

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The ideal mail list management system. Contains duplication elimination, various sorting capabilities and search codes. Can utilize all fonts and styles, mail merge, envelope printing, plus much more. Works great with Canadian postal codes and other international mailing requirements. **BUS 0025 $75.**

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Letraset		
GRA0151	ColorStudio	649.
DTP0019	ImageStudio 1.5	139.
MacroMind		
GRA0140	MacroMind Director 2.0	439.
Metro Image Base		
	Full Line Available	ea. 85.
MicroFrontier		
GRA0215	Enhance	239.
Paracomp		
GRA0235	FilmMaker	439.
GRA0233	Swivel 3D Professional	439.
GRA0234	SwivelArt	82.
Preferred Publishers		
GRA0239	Master Color	99.
GRA0238	Master Paint	50.

MacPlus/SE- with Extended Keyboard Carrying Case (Targus)
Pamper your Mac with a Targus case made of Zilicone treated nylon to give you waterproof durability and an impact absorbing high-density foam layer with a soft protective lining for complete protection. There's room for everything from your Mac, a hard disk drive, and the extended keyboard to pockets for your mouse, floppies, cables, and pens. **ACC 0250 $69.**
Full Mac line available in black. Some styles available in blue, burgundy, and platinum. Premier Leather Case now available (black) **ACC 0482 $175.**

Silicon Beach		
GRA0092	Digital Darkroom 2.	259.
GRA0131	Super 3D 2.1	339.
HYP0027	SuperCard 1.5	205.
GRA0112	SuperPaint 2.0	135.
Solutions, Inc.		
DAC0002	SmartScrap & The Clipper 2.01	56.
Strata		
GRA0176	StrataVision 3D	375.
Strategic Mapping, Inc.		
GRA0227	Atlas MapMaker 4.5	369.
Studiotronics		
GRA0189	Colorset 1.5	229.
SuperMac		
GRA0109	PixelPaint 2.0	225.
GRA0249	PixelPaint Professional 2.0	465.
Tactic Software		
GRA0110	ArtClips 1st Edition	51.
GRA0160	ArtClips 2nd Edition	65.
DAC0011	Icon-It! 2.1	45.
T/Maker Co.		
GRA0209	ClickArt Business Cartoon	33.
GRA0039	ClickArt Business Image	32.
GRA0088	ClickArt EPS Illustrations	82.
Zedcor		
GRA0199	DeskPaint 3.3	115.

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Aura Systems		
DRI0220	ScuzzyGraph	729.
Caere		
INP0143	Typist	479.
CoStar		
INP0091	LabelWriter	185.
Hewlett Packard		
INP0096	HP DeskWriter - 2279A	759.
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MON0016	8-bit 19" Hi-Res Greyscale for SE/030	1899.
MON0006	Rival System for Mac II	1269.
MON0006	Rival System for Mac SE	1269.
MON0007	Rival System for Mac SE/30	1269.
Seikosha		
INP0041	Seikosha SP 2000 AP Printer	235.
Sharp		
COMP007	Wizard OZ 7000 (32KRam)	229.
COMP018	Wizard OZ 7200 (64KRam)	255.
ThunderWare		
INP0116	LightningScan 400	385.
INP0007	ThunderScan Plus	199.

INPUT & OUTPUT

Calcomp		
INP0102	The Wiz Pen	57.
INP0098	The Wiz Tablet	159.
CH Products		
INP0121	RollerMouse ADB	75.
Datadesk International		
INP0097	DataDesk Switchboard	159.
INP0047	Mac 101 Keyboard SE/II	129.
Digital Vision, Inc.		
GRA0145	Computer Eyes B & W	199.
GRA0154	Computer Eyes For Mac-Color	349.
Kensington		
NP0059	Turbo Mouse	109.
INP0060	Turbo Mouse ADB (SE or II)	109.
Key Tronic		
INP0083	Key Tronic Mac Pro Keyboard	118.
Koala		
INP0127	MacVision 3.0	269.

Kraft		
INP0064	ADB Joystick Premium II (Mac SE & II)	29.
INP0094	Kraft ADB Trackball	79.
Kurta		
INP0113	IS/ADB Tablet 8 1/2 x 11	319.
INP0114	IS/ADB Tablet 12 x 12	385.
INP0115	IS/ADB Tablet 12 x 17	625.
Microspeed		
INP0126	MacTRAC ADB	75.
INP0140	MacTRAC DB9	62.
MicroTouch		
INP0084	The UnMouse	189.
Mouse Systems		
INP0132	Little Mouse ADB	75.
INP0134	Trackball / ADB	69.

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DRI0288	PowerCache - 40 MHz (IIci)	1015.
DRI0290	PowerCache - 50 MHz (IIci)	1795.
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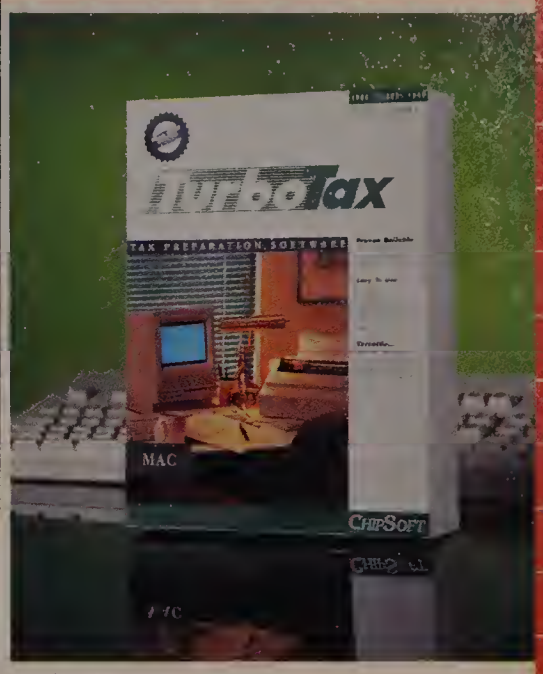

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DRI0152	MaraThon 030X (MacIIx) w/ Virtual	529.
DRI0151	MaraThon 030-SE/030 w/ Virtual	529.
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MicroTech International, Inc.		
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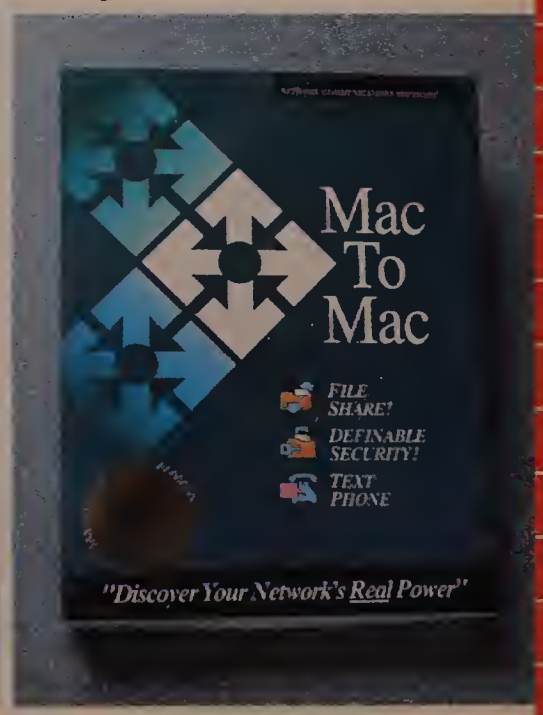

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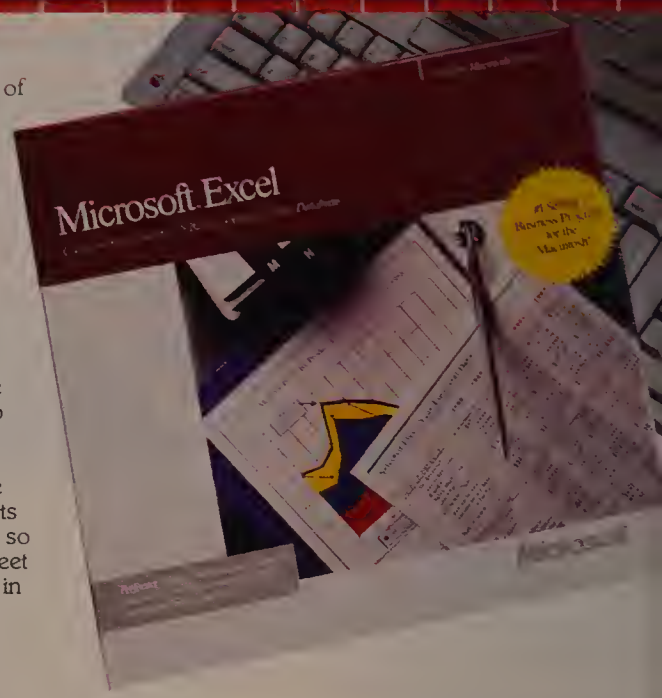

DRI0317 Mac Classic Upgrade Kit 40-1 ..... 499.
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UTI0149 Symantec Antivirus for the Mac 2.0 (SAM) 67.

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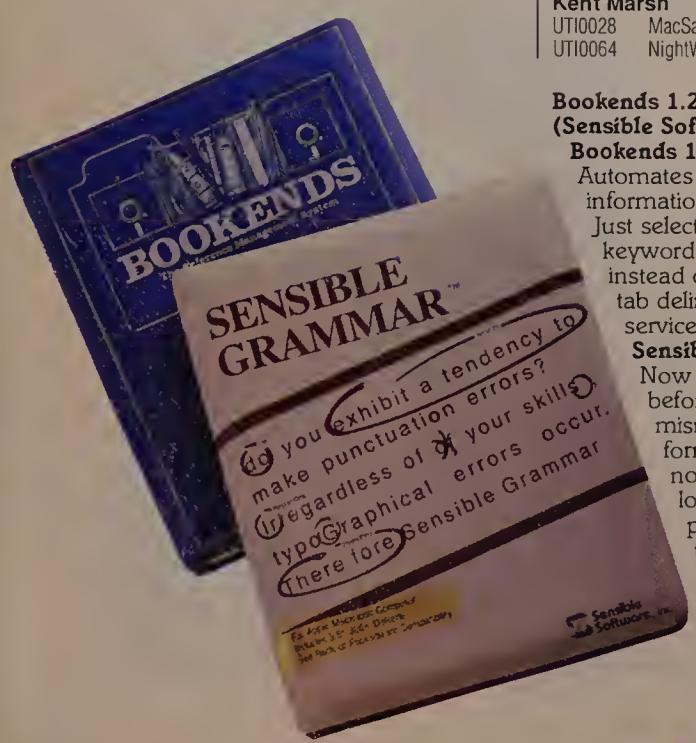

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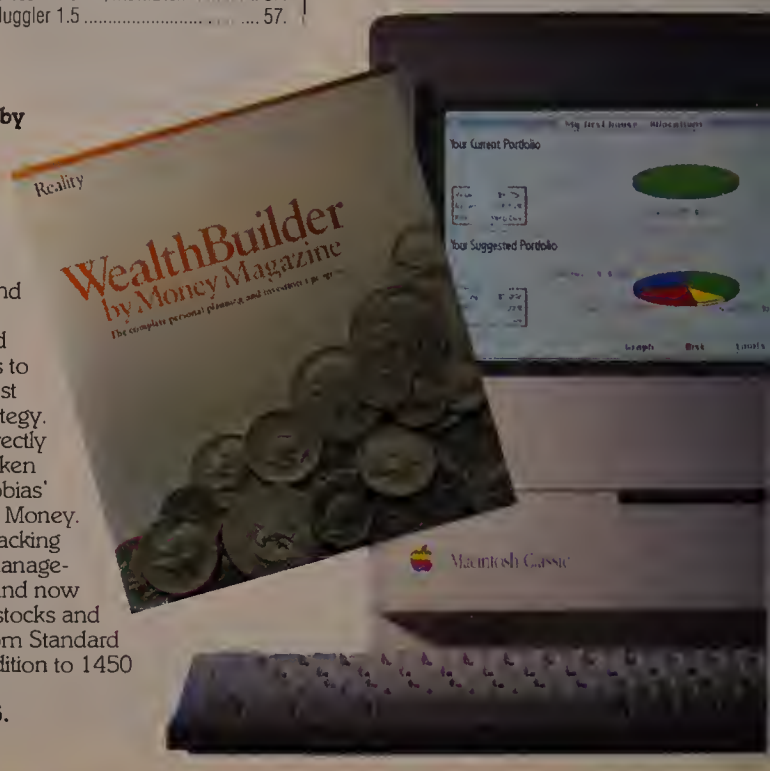

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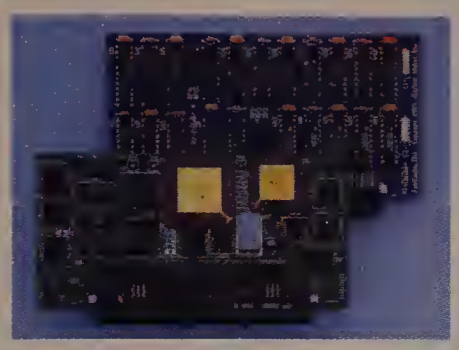

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MAC W

A critical comparison of the Macintosh and IBM PC worlds

DAVID BISHOP

S PC

BY JIM HEID

Some people say comparing the Mac and the PC is like comparing apples and oranges. The truth is, it's more like comparing apples and almost every other fruit. The PC world is that huge: roughly 71.8 million machines compared to about 4.4 million Macs. Dozens of computer manufacturers, not just one. Hundreds of computer models of varying speeds ranging in price from a few hundred dollars to over $15,000. Several types of system software, four disk formats, four expansion-slot designs, and a half-dozen video standards. It's an anarchic cornucopia from which spills everything from one-pound laptops to mail-order imports to premium-priced powerhouses.

Because the PC world isn't uniform, making direct comparisons between specific machines is difficult and of little value. A more useful approach is to step back and evaluate both camps from several standpoints: affordability, ease of use, hardware expansion flexibility, networking flexibility, and performance.

We aren't here to contrast corporate cultures or jabber about left-brained versus right-brained com-

puting. Let the zealots debate the gestalt of personal computing. What's important to us consumers is finding the tool that does the job and provides the best mix of performance, versatility, and value. And by those yardsticks, the ideal tool may not always be a Macintosh.

Affordability

It doesn't matter what a computer can do if you can't afford it. To judge each camp's overall affordability, I compared the cost of various systems, common add-ons, and software.

System Until last October, Mac prices couldn't compete with PC prices. Today, thanks to the unveiling of three low-cost Macs, Apple's prices compare favorably to those of the PC world's two leading manufacturers, IBM and Compaq.

All Macs include more standard features than do comparable PCs. Networking, Small Computer Systems Interface (SCSI), and sound-playback circuitry are built into every Macintosh, but are options on nearly all PCs. (A few high-end IBM machines now include built-in SCSI.) All fast Macs except the IIsi contain math coprocessors, options on PCs. (And costly ones at that—Compaq charges $1499 for a 33MHz 80387 chip.) Figure these extras into the equation, and Apple's prices look downright reasonable. You couldn't have said that a year ago.

On the other hand, the PC world has a bigger bargain basement. It's easy to find PCs that retail for considerably less than the $999 Mac Classic. But these machines often deliver performance that's mediocre at best, and abysmal when you try to run a graphical environment such as Microsoft Windows, which gives PCs a Mac-like interface. And forget about running the more sophisticated OS/2 operating system.

One such machine is the $750 Tandy 1000 RL, a home-oriented PC that includes Tandy's DeskMate graphical user interface and software for word processing, storing recipes, and balancing checkbooks. DeskMate's interface is crude and clunky compared to the Mac, but it does provide consistency and ease of use. Still, the Classic, which retails for a few hundred dollars more, is a far superior machine.

IBM's low-end offerings have traditionally been uninspiring, and its latest entry-level machine, the PS/1, continues the trend. For $999 you get a machine with no hard drive and only 512K of memory. (The Mac Classic also lacks a hard drive, but includes 1MB of memory.) The "high-end" PS/1 sells for $1999 and provides 1MB of memory, a 30MB hard drive, and a fuzzy color monitor that can't compare to Apple's $599 Macintosh 12-" RGB Display. All PS/1 computers include the PC version of Microsoft Works and Prodigy software. Unlike Tandy, IBM didn't bother making the interfaces consistent between Microsoft Works and Prodigy.

As for the midrange, $2500 to $5000 buys a better, albeit less expandable, Mac than it does a PC. Midrange PCs—units such as IBM's Model 55SX, Compaq's 386s/20, AST's Bravo/386SX and Premium/386SX, and Epson's Equity 386SX use Intel's 80386SX microprocessor, whose 16-bit external data path limits performance. The Mac LC also has a 16-bit external data path, but the Mac SE/30 and IIsi are true 32-bit computers.

When you get to the top, the price-to-performance tables turn sharply in Apple's favor. Compare a Mac IIfx equipped with 4MB of RAM, an 80MB hard drive, a Macintosh Display Card 4•8, and an AppleColor High-Resolution RGB Monitor to some high-end PCs. That IIfx retails for $11,516. A similarly equipped IBM Model 80 386, which uses a slower 25MHz 80386 processor, retails for $11,747. Meanwhile, a similarly equipped Compaq Deskpro 386/33 with a 33MHz 80386 processor lists for $12,297. (Compaq ceased production of the 386/33 late last year, but still sells the machine on a while-supplies-last basis.) Although I wasn't able to lay my hands on a 25MHz 80486 computer, I've seen tests that indicate that it provides only a 15 percent performance increase over a 33MHz 80386 machine, meaning the IIfx would still offer comparable—if not better—performance at a better price.

As far as portable computers are concerned, however, the PC world is clearly superior. While Apple works to develop a successor to its overweight, underpowered Macintosh Portable, several PC manufacturers, including Compaq, Toshiba, and Texas Instruments, have been delivering laptops that pack hard disks, 20MHz 386SX processors, and even fax modems into packages weighing less than 8 pounds.

Of course, comparing Apple's prices against only IBM's and Compaq's is like comparing Mercedes' prices against only BMW's and Audi's. There are a lot of Hyundais in the PC world—*clones* that can use PC software and hardware but cost less than comparable IBMs or Compaqs. Dive into the gargantuan PC mail-order market, and you can find not only heavily discounted prices on clones from firms such as AST Research and Epson (whose computers are also available through retail stores), but also manufacturers such as Dell Computer (whose computers are available primarily through the mail). Until we see Macintosh clones, the best buys belong to the PC world.

Peripherals Thanks to greater competition and the larger market, the PC world also offers better buys in add-ons. The price gap is narrow, however, with popular peripherals such as hard drives, modems, monitors, and memory upgrades.

Printers are a different matter. Mac laser printers still tend to cost more than PC scribes because they use complex PostScript or PostScript clone controllers. (GCC's PLP series and Apple's Personal LaserWriter IISC are exceptions in both price and lack of PostScript.) By comparison, non-PostScript PC lasers such as Hewlett-Packard's LaserJet series contain relatively simple controllers with inferior typographic talents and no networking abilities. As a result, they're less expensive. You can add PostScript and networking features to these printers, but doing so boosts the cost.

Non-Apple dot matrix printers for the Mac are costlier, too. That's because they usually include the fonts and printer driver software that let you use them with any Mac application. On the PC side, supporting a printer is the responsibility of application developers, not printer manufacturers. That makes for cheaper printers, but it also means you can use a printer only with applications written to support it. This restriction doesn't apply to programs

Face to Interface

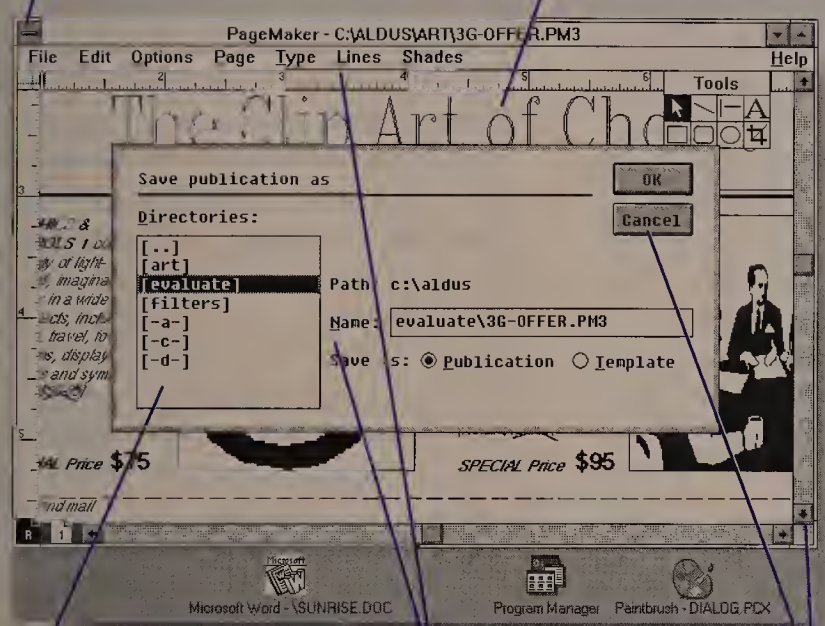
Windows 3.0 (left) and the Mac (right) look similar at first glance, but there are significant differences in their interfaces and underlying system software. A guided tour of these Aldus PageMaker screens shows that the Mac's beauty is more than skin deep.

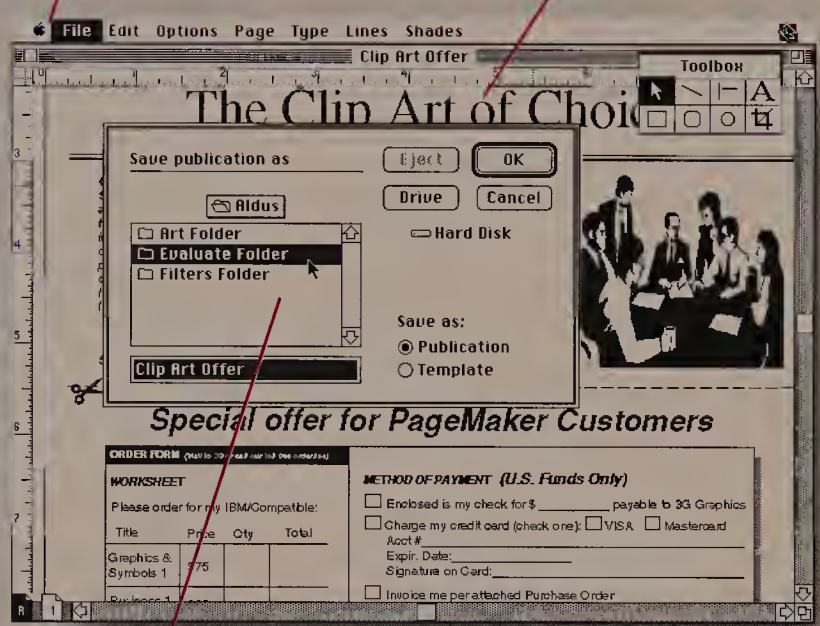
Windows' Minimize command lets you shrink an application window to an icon (like those shown here) without quitting the program—great for avoiding screen clutter. Another command, Maximize, enlarges a window to fill the screen.The Mac's System 7.0 will offer a similar convenience.

Windows' screen fonts aren't as attractive as the Mac's, and they're slower to appear—so much slower that most Windows word processors have draft viewing modes that show all text in one font and size.

The Mac's Apple menu allows fast access to desk accessories and other open programs. Windows provides accessories such as a calculator, Control Panel, and clock, but you have to double-click on their icons to use them. The Mac's System 7.0 will provide both options.

Now that's more like it. No draft mode needed on the Mac, and what you see is a lot closer to what you get.





Windows runs on top of the aging MS-DOS operating system, which limits file names to 11 characters, versus the Mac's 30. Disk drives aren't referred to by name as on the Mac, but by letter. The names [evaluate] and [filters] are subdirectories, rough equivalents to the Mac's folders.

Windows allows every command and dialog box option to have a keyboard shortcut, invoked by pressing the keyboard's Alt key along with the underlined letter. You can use most Windows programs without a mouse, but dragging and drawing are cumbersome.

Buttons and scroll bars in Windows 3.0 have an attractive, three-dimensional look.

A file system to die for. No need for cryptic, 11-character file names here, and disks have names, not letters. And easy-to-navigate file folders take the place of muddy concepts such as paths and subdirectories.

written for Windows and OS/2's graphical Presentation Manager, which use system-level printer drivers similar to the Mac's. If a printer is supported by Windows or Presentation Manager, you can use it with any Windows or Presentation Manager program.

Software Mac hardware may cost more, but software generally costs less. A study conducted in 1989 by Soft-Letter, a software industry newsletter, found the average price for PC software was $270, compared with $195 for Mac software. To see for myself, I compared the mail-order prices of numerous programs available for both platforms. The results were similar—the average price of the MS-DOS versions was $321, versus $271 for their Mac counterparts.

Ease of Use

Here's where Mac diehards expect the usual praises: Once you've learned one Mac program, you've learned them all. Every PC program works differently. The Mac is an intuitive, plug-and-play machine. PC setup requires hours of switch fiddling and head scratching.

These statements were true back in 1984. Some are still valid. But today's PCs are friendlier than those of yesteryear, and the Mac has grown more complex as it's grown up. Overall, Macs are still easier to set up and use, but the gap is narrowing.

Hardware Setup Some economy-priced PCs still require you to flick small logic-board switches to configure memory and tell the system what kind of add-ons you have. More often, however, you'll find self-configuring features similar to those of the Mac II family. IBM's MicroChannel expansion slot design is a good example: when you get a new expansion board, you run a simple configuration program that activates the board's features. And although it's currently available on only a few expensive PCs, the Extended Industry Standard Architecture (EISA) expansion-slot design, a competitor to MicroChannel, has similar self-configuration talents.

Even many machines that use the aging Industry Standard Architecture expansion bus—which first appeared in the IBM PC AT—provide some self-configuration features. Take AST's Bravo/386SX and Bravo/286. They won't automatically configure a system for every new expansion board, but they do automatically adapt to newly installed memory upgrades. And you can install those upgrades yourself. In contrast, the Mac Plus, SE, SE/30, and Classic are factory sealed, and upgrading their memory requires adjustments to the power supply and other internal components.

Yesterday's PCs rarely included video display circuitry or hard drives. Assembling a system meant researching, choosing, and then installing a variety of options—and hoping they would coexist with each other. Compared to that, the original Macs offered plug-and-play operation.

Today, most PCs (including IBM's PS/2s) include basic necessities such as built-in video circuitry and hard drives. You usually buy system software and a mouse separately, but at least PCs include keyboards; Apple sells keyboards separately for all Macs but the Classic and LC. And except for the IIci and IIsi, the Mac II family doesn't include video hardware. So, PCs are acquiring the plug-and-play virtues of the original Macs while the Mac has acquired the PC's expansion flexibility—and the extra headaches that sometimes accompany it.

But on the whole, the Mac family still has the edge in setup simplicity. Compact Macs remain a breeze to set up, and their sealed-box design makes upgrading easy, since a technician does it for you. And it's generally easier to set up or upgrade a member of the Mac II family than a PC- or AT-bus machine. I spent two hours getting a Sitka's FlashCard network board to work in the AST Bravo/386SX. But the gap between the Mac and Micro-Channel machines is smaller. I've installed several expansion boards in IBM PS/2s and have never needed to venture beyond the setup utility's automatic configuration menu.

Sizing Up System Software Newcomers need system software that's straightforward and easy to learn; veterans need software that lets them operate quickly and efficiently. The most visible member of the Mac's system software—the Finder—is superbly suited to the beginner. A few minutes of clicking and dragging is all it takes to learn how to start programs and manage disks.

When you open the Mac's System Folder, however, you're suddenly faced with managing printer drivers, start-up documents, Control Panel documents, fonts, desk accessories, and more. The Mac is still a computer, and mastering it means learning more than just clicking and dragging. System 7.0, with its new options for organizing files and customizing your desktop, will be even more complex.

IBM's PS/1 and Tandy's 1000 RL provide graphical interfaces to shield beginners from traditional PC interfaces. But they're clunky, simplistic, and have a condescending feel. Just as some people yell at foreigners in the hope that the extra decibels will overcome the language barrier, IBM and Tandy seem to feel that huge, gaudy icons and large type will help beginners understand their machines. What's more, you can't apply your knowledge of these interfaces to those of more sophisticated PCs. Upgrade to a more powerful PC and software, and you have to learn all over again. In contrast, the entire Mac family shares the same simple, elegant interface. It just runs faster as you climb the family tree.

As for MS-DOS, the PC world's leading operating system, it is to a beginner what a tightrope is to an acrophobe. While the Mac's Finder lays all your options on the desktop, MS-DOS makes you delve. To see what's on a disk, you have to ask by typing a command in response to a simple prompt. To copy files, you type another command. To delete files, you type a third command. To start a program, you type its name. In all, you need to memorize about a half-dozen commands for day-to-day computing.

Once you do, you can often navigate more quickly and efficiently than with the Macintosh, whose graphical training wheels can get in the way. You can even avoid MS-DOS's challenges by using a DOS *shell* utility, which stands between you and MS-DOS, and provides menus for managing disks and starting programs.

Then there's Microsoft Windows, which enhances MS-DOS with many Mac-like features and provides a graphical shell for managing files and starting programs. Windows has been around since 1985, but it's only recently become a contender (see "Face to Interface"). Windows 3.0, unveiled with much Apple-like hoopla last May, is attractive and, unlike previous Windows versions, performs well. As a graphical environment, Windows 3.0 is a serious challenger to the Mac, given the generally lower cost of PCs.

But setting up a PC for Windows is much harder than installing the Mac's system software, which usually takes but a mouse click. To get the best performance from Windows, you need to understand its various microprocessor operating modes—real versus standard versus 386 enhanced—and you need to know the differences between the three types of memory MS-DOS can access—standard, expanded, and extended. The Windows manual discusses these matters in detail, under catchy headings like "Moving the EMS Bank Line in Large-Frame EMS Mode." And these aren't trivial topics that a beginner can ignore. Fail to configure Windows properly for your hardware, and the program runs slowly and coexists poorly with non-Windows programs such as Lotus 1-2-3. In short, Windows provides those training wheels that are the hallmark of a graphical environment, but you have to be a unicyclist to get rolling in the first place.

But wait, there's still more: OS/2, the PC world's most technically sophisticated operating system, and its Presentation Manager graphical interface. Presentation Manager in OS/2 version 1.1 did a poor job of hiding the operating system's complexity. In fact, you had to use several separate, awkwardly designed applications to perform the same functions you'd perform in the Mac's Finder.

OS/2 version 1.2 improves on things, but its overall look-and-feel differs from 1.1's. You run programs and manage files differently in 1.2 than in 1.1; even the icons are different. This is consistency? Consider this: for all the improvements the Mac's hardware and system software have seen

COMPARING THE TWINS

Five popular Mac programs—Aldus PageMaker; Informix Wingz; and Microsoft Excel, PowerPoint, and Word—are also available for the PC running Windows 3.0. Here's how each compares to its counterpart.

PageMaker At this writing, PageMaker 4.0 isn't available for PCs, so the Mac version wins. When PC PageMaker 4.0 becomes available (it should be by the time you read this), it'll be a toss-up; Aldus has always done a superb job in making the Mac and PC versions look and work alike. The PC version will undoubtedly support more word processor and graphics formats, due to the many file formats in the PC world.

Excel The Mac and PC versions of Microsoft Excel 2.2 are another pair of nearly identical twins. But the Windows and OS/2 versions of Excel have the edge—they provide superior interapplication communications (IAC) features, thanks to Windows' and OS/2's Dynamic Data Exchange (DDE) mechanisms. Both PC Excels can even control Windows and Presentation Manager programs that don't support DDE. Microsoft has added some IAC features to the Mac versions of Excel and Word, but IAC as it exists in the Windows and OS/2 worlds will have to wait for System 7.0 and new versions of Mac Excel.

Wingz Another toss-up: Informix's spreadsheet and charting program is as impressive under Windows as it is on the Mac. Recalculation speeds are about equal, but the Mac version is a bit faster at tasks such as previewing a page and displaying complex graphs. The Windows version, however, supports DDE.

PowerPoint Microsoft's twin PowerPoints look and work nearly identically, but the PC version boasts powerful chart-generating features, including a minispreadsheet window that lets you type values or import them from an Excel spreadsheet or chart. The PC version also supports more graphics file formats, including TIFF. But the Windows version is significantly slower than its Mac counterpart. The multitude of printers in the PC world complicates formatting tasks, and color presentations aren't displayed as attractively on the PC as on a Mac. Thus, despite its lack of built-in charting, the Mac version wins.

Microsoft Word Word for Windows can make a Macintosh user jealous. It does everything Mac Word 4.0 does, and then some. A built-in programming language, WordBasic, lets you create complex macros with custom dialog boxes that prompt you for information. You can customize the user interface to add your own menu commands that execute macros when chosen. You'll also find revision-tracking features that are sorely missing in Word 4.0. And there's full DDE support for creating hot links between Word and other applications. Spend some time with Word for Windows, and you might not want to switch back to Word 4.0 on the Mac.

Numerous other programs will be available on both platforms soon. A Macintosh version of Xerox's best-selling Ventura Publisher should be available by the time you read this, as should a Windows version of Aldus Persuasion 2.0. Look for a Windows version of QuarkXPress later this year. Also available for Windows are Spinnaker Software's Plus, a HyperCard clone, and Software Ventures' MicroPhone II, a communications program.

Some Mac hardware vendors are venturing into PC waters, too. RasterOps and Radius now offer video hardware for PCs. You'll find Windows versions of Caere's OmniPage and Typist optical character recognition products. And The Voyager Company is converting its HyperCard-based AmandaStories and CD ROM and videodisc titles to work with Asymetrix's HyperCard-like ToolBook, which runs under Windows 3.0.

Hmmm. Maybe the Mac is being cloned after all.

since 1984, the basic look-and-feel of the Mac's interface hasn't changed. Apple started with a simple operating system but a well-conceived interface that has stood the test of time. With OS/2 and Presentation Manager, IBM and Microsoft started with a powerful operating system but a poorly conceived interface—one that's needed two face-lifts in two years. Similar criticisms apply to Windows. If the Mac's system software had taken five years to reach its stride, the Mac would never have survived.

It's also worth noting that Windows and OS/2 have steep hardware requirements. For satisfying performance, you need a PC with the processing punch of a Mac SE/30 or IIsi. Windows and OS/2 are also a hard-drive manufacturer's dream: both consume a whopping 8MB of hard drive space. (That doesn't even take into account applications, most of which also require a hard drive.) Meanwhile, most leading Mac applications do require a hard drive, but at least you can—if you have to—fit an entire System Folder on one floppy. And quite a few programs still run on a Mac with only two floppy drives.

The Mac also has the typographical edge. Adobe Systems' Adobe Type Manager is available for the Mac and for Windows 3.0, so Type 1 PostScript fonts look good at any size on both platforms. But the Mac's other screen fonts are generally more legible than their Windows and Presentation Manager counterparts. Apple's System 7.0 will strengthen the Mac's lead, but again, only temporarily. Future versions of OS/2 and Windows will contain Apple's TrueType outline font technology (Apple and Microsoft have signed a cross-licensing agreement for TrueType), giving PC users access to the same fonts, and limitless range of screen font sizes, that System 7.0 users will enjoy.

Finally, OS/2 provides true multitasking, versus the nonpreemptive multitasking provided by the Mac's MultiFinder (and Windows). In a nutshell, OS/2 allows an application program to be divided into *threads*, many of which can run at the same time. Thus, not only can numerous programs run simultaneously, but one program can perform numerous tasks simultaneously. The OS/2 version of Aldus PageMaker showcases this talent nicely. You can, for example, for-

Comparing Performance

Model	Mac Classic	PS/1	Mac LC	Bravo/386SX	Mac IIsi
Manufacturer	Apple	IBM	Apple	AST Research	Apple
RAM/hard drive configuration	2MB/40MB	1MB/30MB	2MB/40MB	2MB/45MB	5MB/80MB
Math coprocessor installed	NA	NA	NA	no	yes
System software versions[2]	6.1.6/6.0.6	4.0/3.0	6.1.7/6.0.7	3.3/3.0	6.1.6/6.0.6
Processor	68000	80286	68020	80386SX	68030
Clock rate	8MHz	10MHz	16MHz	16MHz	20MHz
Retail price as configured[3]	$1499	$1999	$2499	$2845	$4814

[1] Out of production, but sold while supplies last.
[2] System software versions are listed as Finder/System for Macs, and MS-DOS version/Windows version for PCs.
[3] Retail prices do not include monitors or video cards, if separate ones are required.

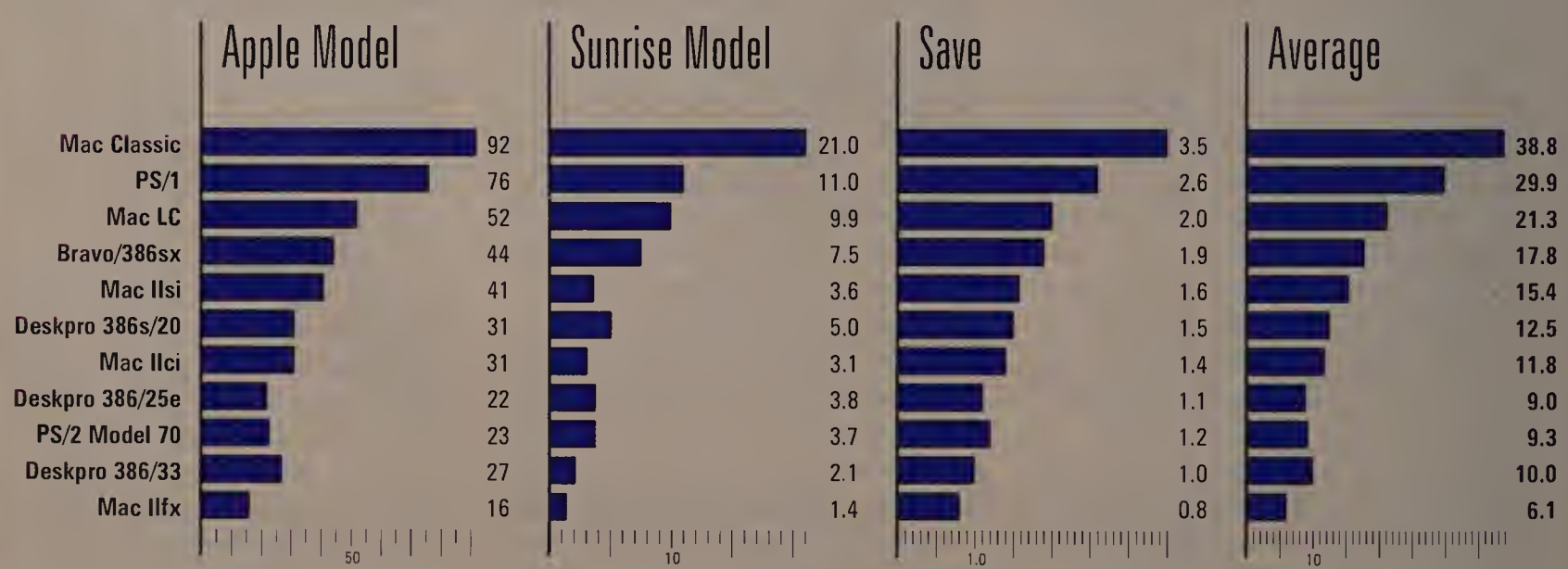
PowerPoint

Times in seconds

For Microsoft PowerPoint I used the Columbus sample document that accompanies both PowerPoint versions. It's no contest: the Mac version left its Windows counterpart in the dust.

Excel

Times in seconds

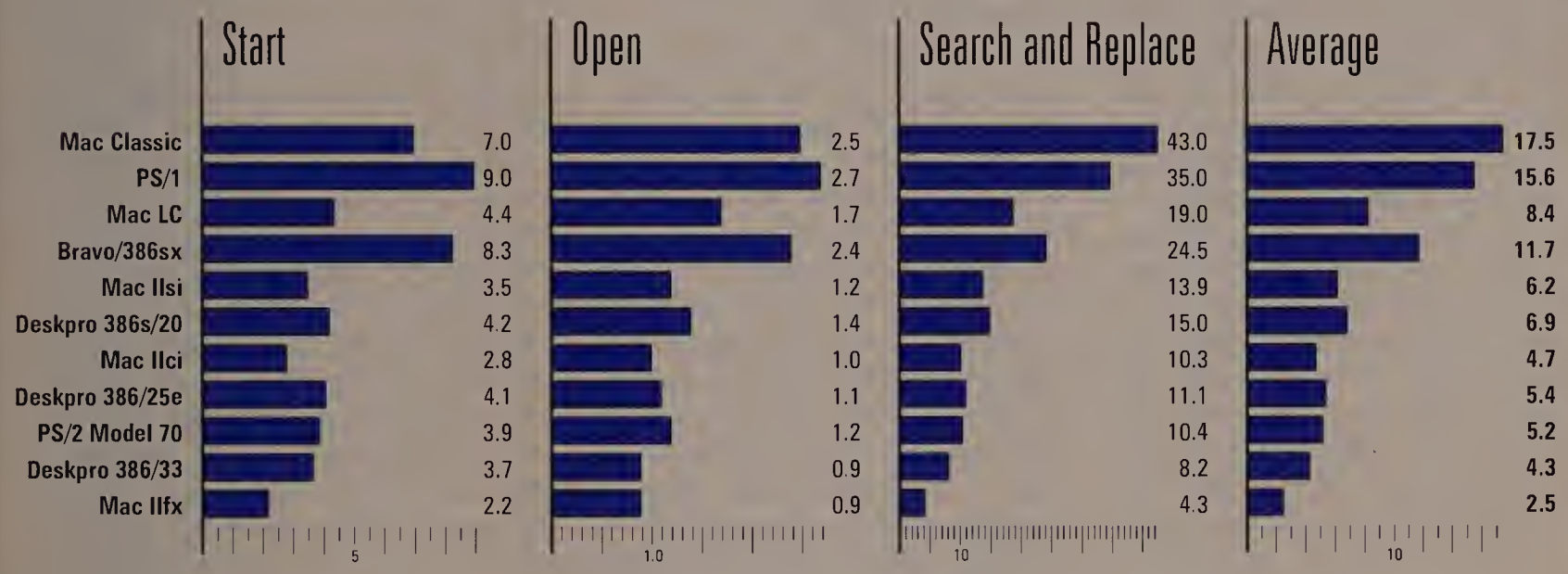


The Apple Model in my tests comprised a series of Excel macros, worksheets, and charts created by Apple's Ted Barnett designed to simulate an Excel work session. The Sunrise Model refers to Russell C. Anderson's calculation-intensive shareware model that graphs sunrise and sunset times and other meteorological information. The Windows version of Excel usually beat its Mac cousin—despite the fact that most of the PCs I tested lacked math coprocessor chips. Microsoft took great pains to optimize Excel for Windows, knowing it would be benchmarked against the fast, character-based Lotus 1-2-3. The effort clearly paid off.

Deskpro 386s/20	Mac IIci	Deskpro 386/25e	PS/2 Model 70	Deskpro 386/33[1]	Mac IIfx
Compaq	Apple	Compaq	IBM	Compaq	Apple
4MB/120MB	4MB/80MB	4MB/60MB	12MB/60MB	2MB/84MB	8MB/80MB
no	yes	no	no	yes	yes
4.01/3.0	6.1.5/6.0.5	4.01/3.0	3.3/3.0	4.01/3.0	6.1.4/6.0.5
80386SX	68030	80386	80386	80386	68030
20MHz	25MHz	25MHz	25MHz	33MHz	40MHz
$4299	$6669	$6199	$7220	$11,598	$10,868

Word

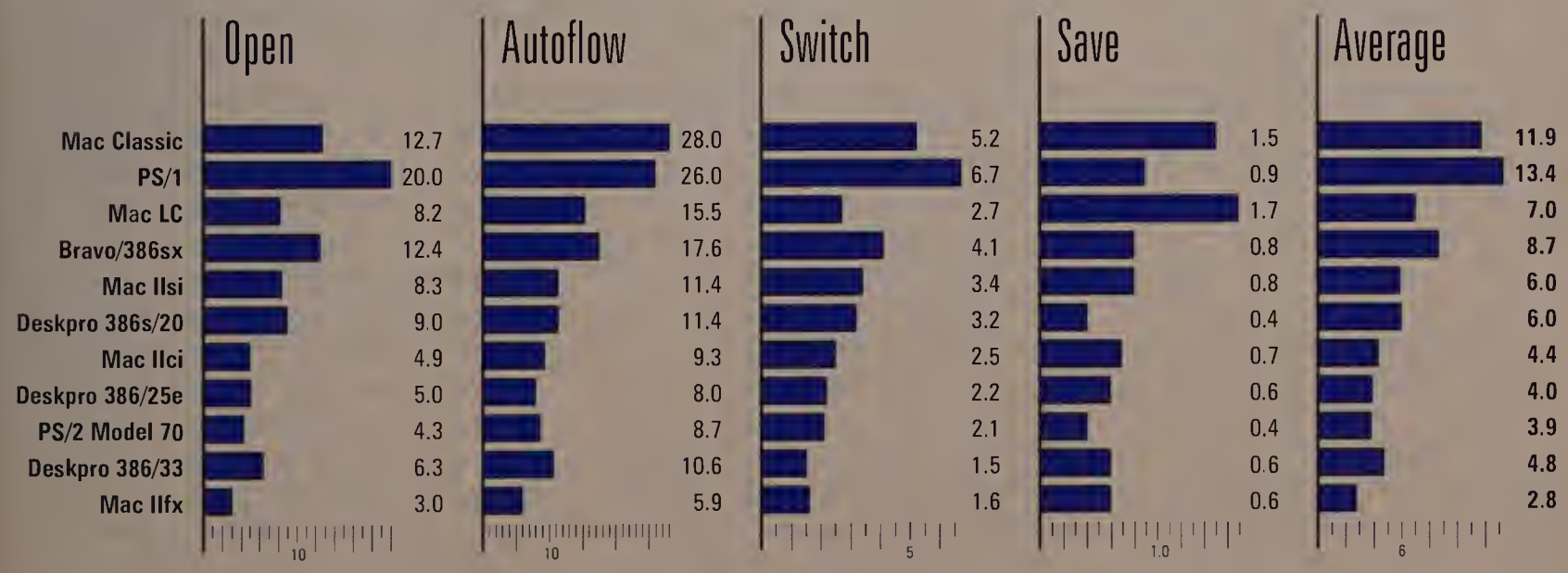
Times in seconds



I used a 5-page, single-space document containing several styles of Courier. The search-and-replace test involved changing 1375 lowercase *e*'s to pound signs (#). The Mac version of Word may not have all the features of its Windows counterpart, but it's generally faster.

PageMaker

Times in seconds



I used a 1-page PageMaker 3.0 document containing numerous bitmapped graphics and text in several styles and sizes of Helvetica. The autoflow test used a 4-page Microsoft Word document. There's no cut-and-dried winner here, although the Macs were generally faster at opening documents and switching viewing scales—two graphics-intensive tests.

mat text and choose other commands while importing a large text file. OS/2 also provides *memory protection* features that help prevent one crashed program from crashing the entire system. In all, it's a technically impressive operating system. OS/2, however, has been slow catching on—due in part to its hardware requirements, but mostly because few programs have been developed for it.

The Application Angle The Mac's graphical operating style is also significant from an application software perspective. The advantage is consistency—by and large, all Mac programs work in basically the same way. In the PC world, Windows and Presentation Manager lay the foundation for consistency by providing a Mac-like user interface. However, as mentioned earlier, most PC programs don't use Windows or Presentation Manager.

Some character-based MS-DOS programs provide pull-down menus, dialog boxes, and mouse support without the steep hardware requirements of Windows or OS/2. PC programs such as Microsoft Works, Microsoft Word 5.5, and Fox Software's FoxPro don't look as appealing as true graphical programs, but they provide users with many of the same ease-of-use advantages.

Windows users, meanwhile, can make a conscious effort to choose only Windows applications—capable Windows programs now exist for all major application categories, and many of them began life on the Macintosh (see "Comparing the Twins"). Still, most Windows users alternate between Windows and nongraphical, also called *character-based,* applications. Nor are there enough Presentation Manager applications to allow OS/2 users to spend all their time in a graphical world.

But let's ask the greater question: How important is consistency between applications? It's a boon if you use numerous programs, but many people use only one or two—a word processor and a spreadsheet, for instance. For these users, adapting between two interface designs isn't such an inconvenience. Your stereo and your car radio have different knobs, but you've probably managed to master both.

And are there things you can do with one platform's programs that you can't with the other's? One big gap that Apple's System 7.0 will close is *inter-application communications* (IAC)—the ability of applications to exchange information on the fly. IAC enables you to create so-called hot links between programs. Both Windows and the Presentation Manager support IAC, called Dynamic Data Exchange (DDE) in the PC world. In Windows, for example, you can set up a link between an Excel chart and a Word for Windows document so that when the chart's spreadsheet data changes, the chart in the Word document automatically updates.

Expansion Flexibility

What a machine can do today is one thing; where you can take it tomorrow is another. How do the Mac and PC compare from a hardware expansion standpoint? On the whole, it's a choice between the PC's selection and the Mac's sophistication.

One way to measure hardware flexibility is to count expansion slots, which fend off hardware obsolescence by providing room to grow. In the PC world, slots are common. Most machines offer between three and five, although some have as many as seven. Even the Tandy 1000 RL mentioned earlier has one. IBM's PS/1 doesn't, but it does accept an external expansion chassis containing three slots.

The compact Mac line offers little room to grow. The Plus has no expansion slots. The SE and SE/30 are only slightly better, each providing one slot. Although you can squeeze accelerators and large-screen monitor adapters into those Macs, there's a limit to what will fit in such a small box. And the new Mac Classic is déjà vu all over again—it, like the Plus, is slotless.

Then there's the modular Mac II line. The IIci and IIcx each provide three NuBus expansion slots, the IIx and IIfx six, and the IIsi, when equipped with Apple's NuBus Adaptor Card, one. The IIsi and IIfx each also contain one *processor-direct slot* (PDS). Straddling the fence between the compact and modular Macs is the new LC, which has one PDS.

But having slots and filling them are two different things. The PC world offers a larger selection of expansion boards, especially for the classic PC expansion bus—the so-called industry-standard architecture (ISA). And the variety is mind-boggling. You'll find multifunction boards that cram memory and additional printer and serial ports onto one board. Internal modems are a dime a dozen. (Or almost: I've seen 1200-bps modem boards for as low as $49.) A raft of versatile video boards can support all the PC world's popular video standards. You can even buy boards containing ultracompact hard drives. And there are boards you wouldn't expect in the pinstripe PC world, such as digital audio adapters, MIDI interfaces, even music synthesizers.

In the Mac world, most expansion boards are video boards—not surprising, given the Mac's superb color and gray-scale display capabilities and its ability to drive several monitors at once. (The latter is something PCs generally can't do, by the way.) Although network and fax boards are available, the selection is sparse compared to the PC world. Only a few internal modems are available, and all cost at least a few hundred dollars. The Mac does have the edge in digital audio boards, thanks to Digidesign, whose Sound Accelerator and Audiomedia boards can turn Mac IIs into digital audio workstations without PC peers.

Another way to judge hardware expansion flexibility is to assess the upgrade paths a computer manufacturer provides. The Mac wins here. You can turn an SE into an SE/30 for $1699. Or, turn a used Mac II into a top-of-the-line IIfx for just $2999 plus memory. Some people whine about Apple's upgrade prices, but the fact is, very few major PC manufacturers provide similar options, especially for their low-end machines.

Networking Flexibility

In the business world, the ability to network machines to share data and expensive add-ons—laser printers and hard drives, for example—is a big asset. The Mac world leads in small networks, but the PC's business heritage gives it the edge in large networks where speed, security, and reliability are critical.

Low-end Mac networking is a relatively economical proposition. A

LocalTalk interface is built into every Mac. As a result, you can connect Macs to share a printer by simply adding a connector and cable to each machine.

PCs don't have built-in network interfaces. So if you want to put a PC on a network—whether it be LocalTalk, Ethernet, or Token-Ring—you must buy an expansion board. Obviously, low-end Mac networking is much less expensive.

When it comes to high-speed networking, however, the tables get turned. It's much more economical to network PCs than Macs with Ethernet and Token-Ring, simply because such PC expansion boards are less expensive than their Mac counterparts. Apples's new Ethernet Cabling System may allow future Macs to have built-in Ethernet interfaces, but the fact remains that Ethernet and Token-Ring networking costs more now for Macs than for PCs.

A similar situation occurs with network software—as a network grows larger, PC-based software takes the lead, in particular where file-server security and reliability are concerned. Mac-based AppleShare file servers can't match the extensive security and reliability options that PC products such as Novell's NetWare provide. (You can, for example, set up a NetWare file server to simultaneously write data to two separate hard drives for extra safety.) What's more, Macs that join Novell and 3Com networks don't have access to all the features those networks provide. Although the Mac has proven itself in business, it's still treated like a second-class citizen by the giants of PC networking.

AT A GLANCE

Affordability Apple's prices stack up well against IBM's and Compaq's, but not against those of mail-order vendors. Mac peripherals often cost more, too. But take heart—Mac software generally costs less.

Networking flexibility The Mac's built-in networking makes low-end peripheral and file sharing cheap, but lower prices for high-speed networking give the PC the edge.

Expansion flexibility The PC has the edge in add-in board selection and number of slots, but the Mac has the edge in add-in board sophistication. Apple, meanwhile, also offers upgrade options most PC vendors don't.

Ease of use The Mac is easier to set up, but the PC is catching up. The Mac's system software outclasses Microsoft Windows, which is bogged down by the PC's text-only past. Mac applications offer more consistent elegant user interfaces.

Performance The Mac family finished first overall in benchmarks. As a graphics-oriented computer, the Mac is clearly superior to the PC. At the high end, the Mac IIfx provides what may be the best price-to-performance ratio in personal computing.

Performance

You can't compare two computing platforms without pitting them against each other on the test track. To find out which camp provides better performance, I ran several tests using programs available for both platforms on representative machines (see "Comparing Performance").

On the whole, Macs finished ahead of their PC counterparts running Windows. In fact, when you compare each machine with its technical counterpart—that is, to the machine with a similar processor clock rate—the Mac is faster overall. (The specific results vary from program to program.) But it's important to remember that relatively few PC programs use Windows or OS/2's Presentation Manager; the vast majority of PC applications are character based. When I compared two Mac applications—FoxBase and Microsoft Word—against their character-based PC counterparts, the Macs finished a distant second.

As you can see, arriving at cut-and-dried performance conclusions is difficult. But I can generalize: with graphical applications, a Mac usually runs faster than a similarly equipped PC. However, if you're willing to forgo a graphical environment, you can often find character-based PC applications that run faster than equivalent Mac programs.

And the Winner Is

In the end, the Mac is the better computer, but the PC remains the better computing value.

Windows and OS/2's Presentation Manager give PCs many of the Mac's most desirable traits—a more attractive, bitmapped screen display; a variety of fonts; device-independent display and printer drivers; and the foundation for consistency between programs. But these attributes are grafted onto computers that would be just as happy displaying an MS-DOS prompt. Despite Microsoft's attempt to make Windows 3.0 "cool," PCs seem happiest in gray flannel suits. But flannel costs less than silk. For the price of a 2MB Mac Classic with a 40MB hard drive, you can buy a mail-order clone that runs faster, supports color, and is more expandable. If you plan to just do some word processing or bookkeeping—if your computer will fill a small niche in your life—or if your budget won't let you combine the Apple logo with all the features you want, by all means consider the PC. And if you want a truly portable computer, the PC world is the place to be.

If you plan to immerse yourself in computing and establish a large software library, you'll be better served by the Mac's consistency, large selection of software, and elegant hardware design. And when it comes to the worlds of computer-aided design, image scanning, interactive video, digital audio, and color publishing—the Mac is by far the best choice. With the Mac, Apple has shown that the best graphical environments run on computers that were designed for them—from the ground up. ■

Contributing editor **Jim Heid** *has been working with the IBM PC and the Mac since each was introduced. His latest book, coauthored with Peter Norton, is* Inside the Apple Macintosh *(Brady, 1989). He is currently working on a complete guide to the Mac, to be published in early 1991 by IDG Books Worldwide.*

ASSEMBLING A TOOLBOX OF ESSENTIAL MAC UTILITIES

Tools of the Trade

I recently stopped by Sears to buy a new socket wrench for my already overstuffed toolbox. I cruised the aisles admiring row after row of shiny new tools: wrenches and screwdrivers and clamps—oh my. There are few things I admire more than solid, well-crafted tools. And there's nothing more useful to a do-it-yourself home owner than a tool chest filled with them. Needless to say, I walked out of the store with more than a socket wrench.

Just as a toolbox of quality tools keeps house and home operating smoothly, you and your Macintosh will work more efficiently, more safely, and more productively if you keep a well-stocked, well-integrated utility tool kit at your side. Indeed, as the Mac becomes more complex and the lapses of Apple's system software become more apparent, a carefully chosen collection of utilities has become an essential part of every Mac owner's software repertoire.

But just as Sears has hundreds of tools of every description, software catalogs are stuffed with dozens and dozens of Mac utilities. Over the years, I've tried just about all of them—and become fond of quite a few. As a result, my utilities toolbox bulges at the seams. When I must, however, I cut back to the ten or so that I consider essential.

In the following pages, I describe the ten types of utilities that should be in every Mac owner's toolbox—the equivalent of the basic hammer, wrench, and screwdriver set that even the most ardent don't-do-it-yourselfer can't live without. I also recommend the top-of-the-line tool in each category. I leave the less-than-essential utilities—the Mac equivalents of tile nippers, joiners, and the like—to the utility-addicted. (You know who you are.)

BY ROBERT C. ECKHARDT

Better than Vitamin C

In scientific circles, there's a lot of argument over whether or not computers can (or should) think the way humans do. Well, the Mac may or may not think like a person, but it is quite capable of getting sick as a dog. A computer virus can put a Mac out of commission just as effectively as a flu virus can lay me low. Even worse, a really nasty virus can destroy data stored on a hard drive or floppy disk. Since the only Mac immune to virus attack is one that's off, an antivirus program is the most important utility you'll ever own.

RON CHAN

Symantec's SAM (Symantec AntiVirus for Macintosh) has all three elements essential to effective virus protection. It locates and, in many instances, eradicates existing infections. A start-up document lurks in the background and prevents infections from occurring. And last but not least, Symantec operates a virus hot line that informs callers of the latest viral strains. Symantec also alerts registered users to new viruses by postcard. Both hot line and postcard explain how to teach SAM to recognize new viruses, so you don't have to wait (and pay) for a software upgrade.

Although I prefer SAM, other users I know swear by John Norstad's freeware program Disinfectant, Microcom's Virex, or Microseeds Publishing's Rival. All three prevent and eradicate viruses, and all three will serve you well.

Healing the Sick File or Disk

A Mac can get sick with a contagious disease, but files, floppy disks, and hard drives can become seriously ill through no fault of a virus. Even the most cautious Mac owner has accidentally erased a file or reformatted a whole disk. Individual files can become corrupted for a variety of reasons and refuse to open.

Although there's no way to prevent such traumas from occurring, complete recovery is often possible with the right tools. I've found Microcom's 911 Utilities to be the most helpful for file recovery. While all recovery utilities can help undelete deleted files, or recover files buried in the rubble of a crashed disk, 911 Utilities is alone in its ability to recover corrupted files that refuse to open.

Patched together from several different programs, 911's seams still show. As a result, using it requires a little extra effort on your part. But the program's Troubleshooting Guide is invaluable, and with its help, 911 Utilities lets you salvage all but the most hopelessly wrecked files.

For repairing flaky or crashed disks, I prefer The Norton Utilities for the Macintosh from Symantec. In addition to performing all the standard recovery procedures, The Norton Utilities can shake down a troublesome disk better than anything I've seen. The program checks that the number of files in a hard drive directory and the number on the drive are the same. It searches out duplicate System and Finder files; it fixes folders that won't open and files that won't delete. Not only that, but it checks every file on the disk for missing Finder icons, incorrect Finder information (bundle bits), and more. If a disk isn't clean and sober when Norton gets through with it, nothing will straighten it out.

SUM II (Symantec Utilities for Macintosh) is also a popular choice for file and disk recovery. I've used it frequently with success, but it's not my favorite. However, it's cheaper than buying both Norton and 911. Anyone who purchases SUM II definitely gets his or her money's worth.

The Ultimate Safety Net

Sadly, heroic efforts from the best recovery program cannot resuscitate a disk whose time is up. When your hard drive is laid to rest atop Boot-No-More Hill, there'd better be a recent backup of your critical files. Unfortunately, backing up is an onerous task. Everyone talks about it, but too many people do nothing.

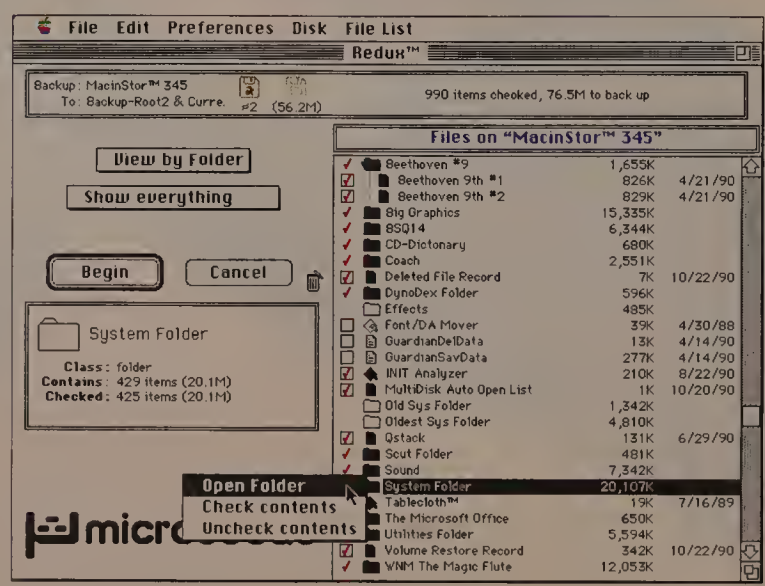
Most backup programs succumb to the proverbial featuritis double-bind: the more flexible the program is (offering all kinds of options and customizable features), the more difficult it is to use. Two backup programs, SuperMac's DiskFit and Microseeds' Redux, relieve backing up pain better than most. Both programs are easy to use, yet relatively powerful, and impose no size limit on the file to be backed up. Both also reclaim and reuse space on existing backup disks during incremental backups (many programs simply tack new and changed files onto the end of the current backup sequence).

Some backup programs store backup files in standard Finder file format; others, in a quest for greater speed, store files in a proprietary backup format. If you don't like the idea of not being able to view and retrieve backup files in the Finder, use DiskFit. It always creates Finder-readable backup files. DiskFit is also notable in that it can perform an unattended backup and turn off the Mac when it's finished.

Redux is an excellent choice for backup, so long as you're not concerned about backup file format. It only stores backup files in Finder-readable format if all the files you want to back up fit on a single backup volume (such as a removable hard drive). Otherwise, the program stores backup files in a format only Redux can read. Backing up with Redux is about as easy as it gets (see "Ready Backups with Redux").

Endless Fonts (and DAs)

Turning from morbid topics like dead disks to the fun stuff, what is more fun than an Apple menu loaded with desk accessories (DAs) or a font menu full of fonts? You can, of course, install fonts and desk accessories in the System file with Font/DA Mover, but that limits you to only 15 DAs. And, having a large number of fonts bloats the System file to excessive proportions. An easier, more flexible, alternative is to use a font/DA utility that



Ready Backups with Redux Pop-up menus make it easy to view and select files for Redux to back up; information about the selected folder (left) and all currently selected files (top) is always available. In addition to selecting files and folders by hand, you can also automate backups and tailor them precisely to your needs with Redux's scripting facility, BackTalk.

STARTING WITH A COMMERCIAL UTILITY COLLECTION

Some people buy tools one at a time. Others prefer to buy one of those specially priced, 250-tool collections and then supplement it as the need arises. If you're the type who likes to start with an all-things-to-all-people collection, then you may want to buy one of the major Macintosh core utility collections—SUM II, The Norton Utilities for the Macintosh, 911 Utilities, and MacTools Deluxe—and build your tool kit from there.

None of the four major collections contain a font/DA utility, a macro program, a screen saver, or an INIT organizer. So you need to put these four types of utilities on your shopping list no matter what. Which and how many of the remaining six should be added to complete your toolbox depends on which core collection you start with.

The Norton Utilities is perhaps the most complete core collection. It provides top-rated disk- and data-recovery utilities, an excellent disk optimizer, a file finder, and a file/folder navigation aid (not to mention a Finder customizer, a Key Caps DA replacement, and more). You need to add virus protection and a backup program to your essential utility shopping list.

MacTools Deluxe includes utilities for disk and data recovery, a backup program, a hard drive optimizer, and a file finder that can search for both file names and file contents. It also offers a disk-partition program, a file-encryption utility, and several other utilities. You have to add virus protection and a file/folder navigation aid to your utility toolbox—as well as the four utilities all core collections lack—if you start with MacTools Deluxe.

SUM II owners already have disk- and data-recovery utilities, a backup program, and a disk optimizer. (In fact, SUM II's backup program is actually a scaled-down version of Redux.) SUM II also provides a disk-partition program and a file-encryption utility, among others. Thus, you need to fill out your toolbox with virus protection, a file/folder navigation aid, and a file finder.

911 Utilities is the only core collection to include a serious antivirus utility: Virex (also available separately from Microcom). Its other utilities are all related to file and disk recovery. Thus, if you start off with 911 Utilities, you need to shop for a backup program, a file/folder navigation aid, a file finder, and a hard drive optimizer.

Finally, keep in mind that some utilities in these four core programs are clearly not the best available in their category. If your core collection contains a backup program or a file finder, for example, you may want to set aside a few dollars a week and replace it with Redux or DiskTop when there's enough money collected in the cookie jar.

can make any number of fonts and DAs (as well as sounds and F-keys) available without installing them in the System file.

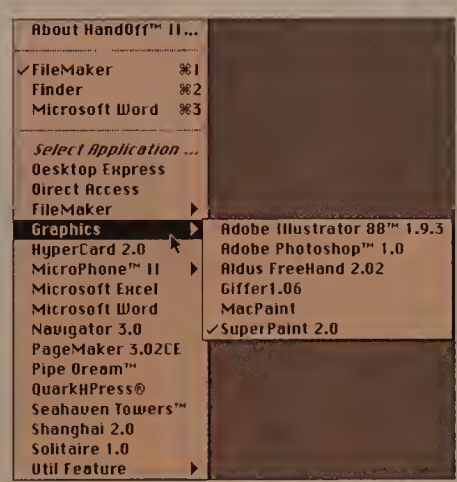
Of the two major contenders in this category, I use Fifth Generation Systems' Suitcase II, primarily because it is a more intuitive program. But MasterJuggler, from AlSoft, is equally commendable. Both make it easy to organize and load (or unload) fonts and DAs. Both can compress screen font files to conserve disk space, and both offer utilities that check for and correct font ID-number conflicts.

File Ho!

In the average Macintosh hard drive, applications, documents, and more are stored in a complex hierarchy of folders within folders. To find a file or application, you frequently must climb laboriously out of one nested sequence and dive into another. Often, the shortest route to a needed file is anything but a straight line, and wrong turns are frustratingly easy.

HandOff II from The Handoff Corporation or On Cue from Icom Simulations can help you navigate such crowded waters. Both create a menu (standard menu bar variety or pop-up, your choice) containing a user-defined list of commonly used applications and documents. Instead of searching through folders, you simply select the desired file or application from the menu. Both also allow you to switch between applications under MultiFinder with user-defined key commands.

Of the two, HandOff II is the better equipped for tough jobs. You can group applications in the HandOff menu into submenus (see "Handy HandOff II"), or specify a collection—what HandOff calls a briefcase—of documents from several applications. Select the briefcase, and the applications and their documents all open at once. You can specify a color depth (black and white, 16 colors, 256 colors) for each application, and when you switch from one to the other in MultiFinder, the color depth changes accordingly. And HandOff II eliminates the Application Not Found dialog box by letting you assign any application to any document. As good as the program is, however, HandOff II's manual is one of the worst I've seen in a while. Plan to spend some time figuring out just what HandOff II can do and how it works.



Handy HandOff II To minimize menu clutter, HandOff II's pop-up menu can group applications into category submenus. Select the category name and the default application, the one marked with a check opens; select any other application within the submenu to open that application.

useful complement to a menu-maker like HandOff II is Aladdin Systems' Shortcut or Super Boomerang (part of Now Utilities from Now Software). Both these utilities allow you to move quickly to commonly used files and folders, delete files, rename files, and create new folders from within the Open and Save dialog boxes. The file and folder menus in both list the most recently opened files and folders; you can also ask the programs to list certain files and folders in the menu at all times.

In Super Boomerang, you can also create permanent lists of files and folders specific to individual applications. Super Boomerang also appends a submenu of files to an application's Open command. Shortcut, on the other hand, is distinguished by its ability to work with files archived by Aladdin's StuffIt Classic and StuffIt Deluxe. Shortcut can list the files in a StuffIt Classic compression archive; unstuff a stuffed file; and if you own StuffIt Deluxe, compress a file from within the Open and Save dialog boxes.

Lost in Space

Not many Macintosh owners have a hard drive as commodious as mine (345MB). But even a 40MB hard drive is plenty big enough for a file to get lost in. Apple's anemic Find File DA can help you find misplaced documents, but it can only search one floppy disk or hard drive at a time. What's more, it can only search for part or all of a document name. If you want to search for a key phrase within a document, Find File gets you nowhere.

CE Software's DiskTop remains my first choice when I'm searching for a file based on its external characteristics: file name, type, creator, size, or creation or modification date. (My paean to DiskTop 4.0 appeared in *Macworld*'s July 1990 issue.) What DiskTop can't do, however, is search file contents.

On Location from On Technology (see *Reviews, Macworld,* September, 1990) is no match for DiskTop in searching file characteristics, but it is miraculous when searching for text in a file. If the price for this modern miracle is too steep, second-choice Microlytics' Gofer is significantly cheaper (and currently a free bonus if you buy DiskTop). But it's slower. On Location's manual, by the way, deserves an award for that all too uncommon combination of clarity and brevity.

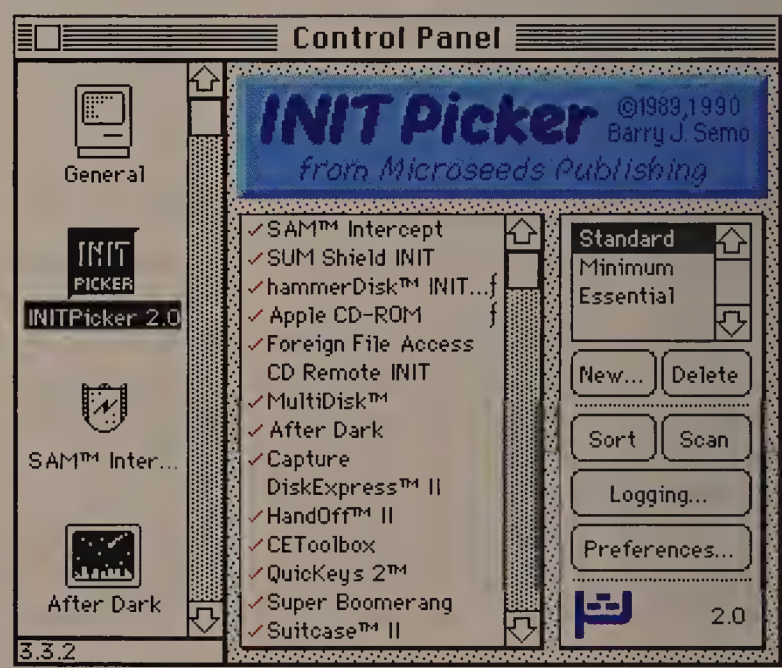
All the King's Horses and All the King's Men

When you use a hard drive, the files it contains tend to become fragmented—stored in sectors scattered throughout the drive, instead of in a single group of neighboring sectors. As fragmentation increases, performance declines because the drive mechanism has to work harder to find all the parts of a fragmented file. Top performance is easily restored, however, by defragmenting—moving the parts of each fragmented file to a sequence of contiguous sectors. You can defragment a hard drive by backing it up (twice, just in case one backup goes bad), erasing it, and copying all the files back on again. But only a masochist with lots of free time defragments a hard drive this way.

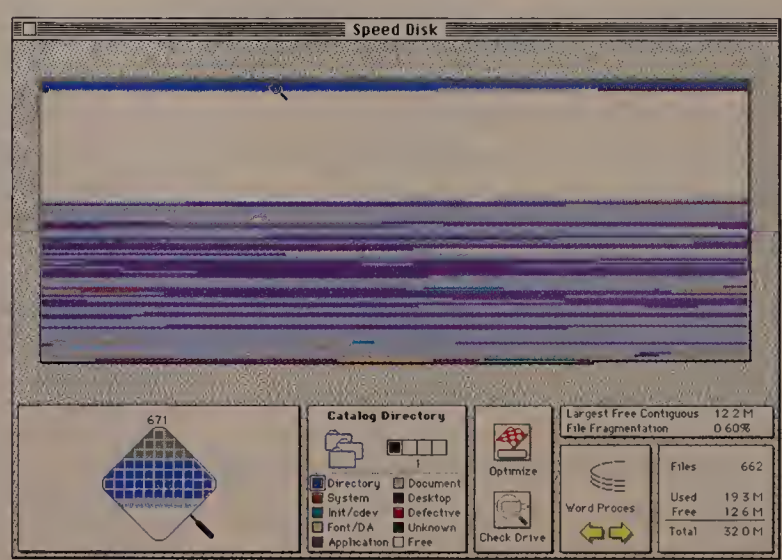
I use DiskExpress II because I'm not a masochist, and more important, because the program is fast and easy to use. DiskExpress II can defragment disks while you work, and it can also prevent fragmentation from recurring once a disk has been defragmented. Speed Disk, part of the Norton Utilities, offers some unusual enhancements (see "Speedy Gonzalez"). But because Speed Disk can neither defragment a disk as you work, nor prevent future fragmentation, I prefer DiskExpress II.

Let Mac Do the Walking

Most users would prefer to issue a single command, rather than a sequence of 10 or 20 keystrokes, to achieve the same result. Such commands are called macros, and a macro utility is a great way to eliminate repetitive typing and boost productivity. For a compendium of several macro programs along with tips on creating useful macros, see "The Desk Potato's Guide to Macros" which will appear



Picking INITs In INITPicker, only checked INITs run at start-up, and you can select (from the list on the right) from any number of user-defined INIT sets. You can store INITs in an INIT folder to help reduce System Folder clutter—such INITs are marked with an *f*—but only some INITs will function properly if put there.



Speedy Gonzalez The Norton Utilities' Speed Disk program displays a remarkable, though perhaps not very useful, map of a hard drive. Different colors indicate different types of files (free space is white), and with the magnifying glass you can enlarge small areas to pinpoint the location of specific files.

UTILITY TOOLBOX

Category	Utility	Price	Company
Backup	DiskFit 2.0	$99.95	SuperMac Technologies
	Redux 1.62	$99	Microseeds Publishing
File/disk recovery	911 Utilities 1.0	$149.95	Microcom
	The Norton Utilities for the Macintosh 1.0	$129	Symantec
	SUM II 2.0	$149.95	Symantec
File finder	DiskTop 4.0	$99.95	CE Software
	Gofer 2.0	$79.95	Microlytics
	On Location 1.02	$129.95	On Technology
File/folder navigation	HandOff II 1.1.3	$79.95	The HandOff Corporation
	On Cue 1.3	$59.95	Icom Simulations
	Shortcut 1.5	$79.95	Aladdin Systems
	Now Utilities 2.0	$129	Now Software
Font/DA utility	MasterJuggler 1.53	$89.95	AlSoft
	Suitcase II 1.2.6	$79	Fifth Generation Systems
Hard drive optimizer	DiskExpress II 2.04	$89.95	AlSoft
INIT organizer	INIT Manager 1.0	$59.95	Baseline Publishing
	INITPicker 2.0	$69	Microseeds Publishing
Integrated utilities	911 Utilities 1.0	$149.95	Microcom
	MacTools Deluxe	$129	Central Point Software
	The Norton Utilities for the Macintosh 1.0	$129	Symantec
	SUM II 2.0	$149.95	Symantec
Macro utility	QuicKeys² 2.0	$149.95	CE Software
Screen saver	After Dark 2.0	$39.95	Berkeley Systems
	Pyro 4.0	$39.95	Fifth Generation Systems
Virus protection	Disinfectant 2.3	free	John Norstad
	Rival 1.1.4	$99	Microseeds Publishing
	SAM 2.04	$99.95	Symantec
	Virex 2.81	$99.95	Microcom

in *Macworld* next month. (My favorite is CE Software's QuicKeys.)

Screen-Saving Equipment

For the Macaholic, preventing burnout isn't always easy. Preventing screen burn-in, on the other hand, is simple. Burn-in occurs when the same image is displayed at full brightness for long periods. The image gets etched onto the screen, and creates a ghost that haunts it forever.

The only surefire way to prevent burn-in is to use a screen-saver utility that automatically displays a safe, ever-changing (preferably humorous) image after a specified period of inactivity. Both top screen savers, Fifth Generation Systems' Pyro and Berkeley Systems' After Dark, offer a variety of animated displays to choose from.

After Dark, however, tops Pyro in two ways. It provides optional sound effects for many of its displays, which means that lightning bolts crash and aquarium bubbles go *glug-glug*. In addition, After Dark offers a greater number of displays that are more entertaining and more colorful—to my taste anyway. For its squadrons of flying toasters (toast darkness is adjustable) and its ability to turn a screen into a sliding-square puzzle, After Dark is irresistible.

Preventing INIT Gridlock

Most of the utilities in the essential toolbox are INITs—System Folder files that the Macintosh automatically loads at start-up. Indeed, many handy programs come in INIT format; many types of hardware—such as CD ROM players, and large-screen monitors—also require INITs. Frankly, INITs have a tendency to proliferate like coat hangers in a dark closet. Unfortunately, when a lot of INITs congregate in a System Folder, they can misbehave. A conflict between two or more inimical INITs can prevent one or more of them from functioning properly, or worse, cause the Mac to crash.

To determine the cause of or to solve conflicts, an INIT organizer is extremely handy. I've always preferred Microseeds Publishing's INITPicker, but a recent newcomer, INIT Manager from Baseline Publishing, is currently hard at work in my System Folder. Both programs allow you to turn INITs on and off, create and select start-up sets containing different combinations of INITs, and rearrange the order in which INITs load (a common technique for eliminating conflicts). Both reduce System Folder clutter by allowing you to store INITs in a separate folder, and both are able to identify and disable some, if not all, troublemakers.

INIT Manager can generate a detailed start-up report, which the technically inclined can use to pinpoint intractable problems. INIT Manager also offers a Control Panel subpanel for storing infrequently used controls, thereby increasing the speed with which the Control Panel opens. INITPicker has a more elegant interface (see "Picking INITs"), a better manual, and only takes the time to scan the System Folder for new INITs when you ask it to. I find it hard to recommend one over the other.

A Tool for All Seasons

Even with the best tools, it's possible to smash a finger if your aim is off, or make a bad situation worse. But with a little preparation (such as reading the manuals) and practice, a small collection of basic, good quality tools can make a world of difference. So don't wait till disaster strikes; start filling—and using—your Mac utility toolbox today. ■

See *Where to Buy* for contact information.

***Robert C. Eckhardt** is a contributing editor of* Macworld *and* Publish. *His latest book is* Inside Microsoft Word for the Macintosh *(Brady, 1990). He's eagerly awaiting a utility that will help him keep track of all his utilities.*

Midrange Hard Drives

Just Right

EVERY TIME MACWORLD LAB gets ready to test hard drives, we just *know* that there can't be more products than there were the last time. But the market hasn't gotten any less crowded—if anything it's even bigger, bringing on a flurry of price wars. For instance, you can get a 115MB drive from Club Mac for only $679—that's $5.90 per megabyte or about as much as you'd pay for three high-density floppies.

For you, the consumer, this crowded hard drive market brings good news and bad new. First the good news—you have many more choices than ever before and you can get some real bargains. The bad news is that finding a bargain can be rough.

Where to go and who to believe? Start here with our review of 115MB to 250MB external hard drives (most of these products are also available as internal drives for all Macs except the Mac LC, IIsi, and Classic which require lower-capacity one-third-height drives). We tested 64 products from 30 companies to find the best buys in performance, price, and features. Keep reading to find out which drives come out ahead and why.

Inside a Hard Drive

Except for Rodime and Toshiba, which manufacture their own mechanisms, all of the hard drive vendors purchase the actual drive

MACWORLD LAB TESTS 64 HARD DRIVES FROM 115MB UP TO 250MB TO HELP YOU FIND A PERFECT FIT

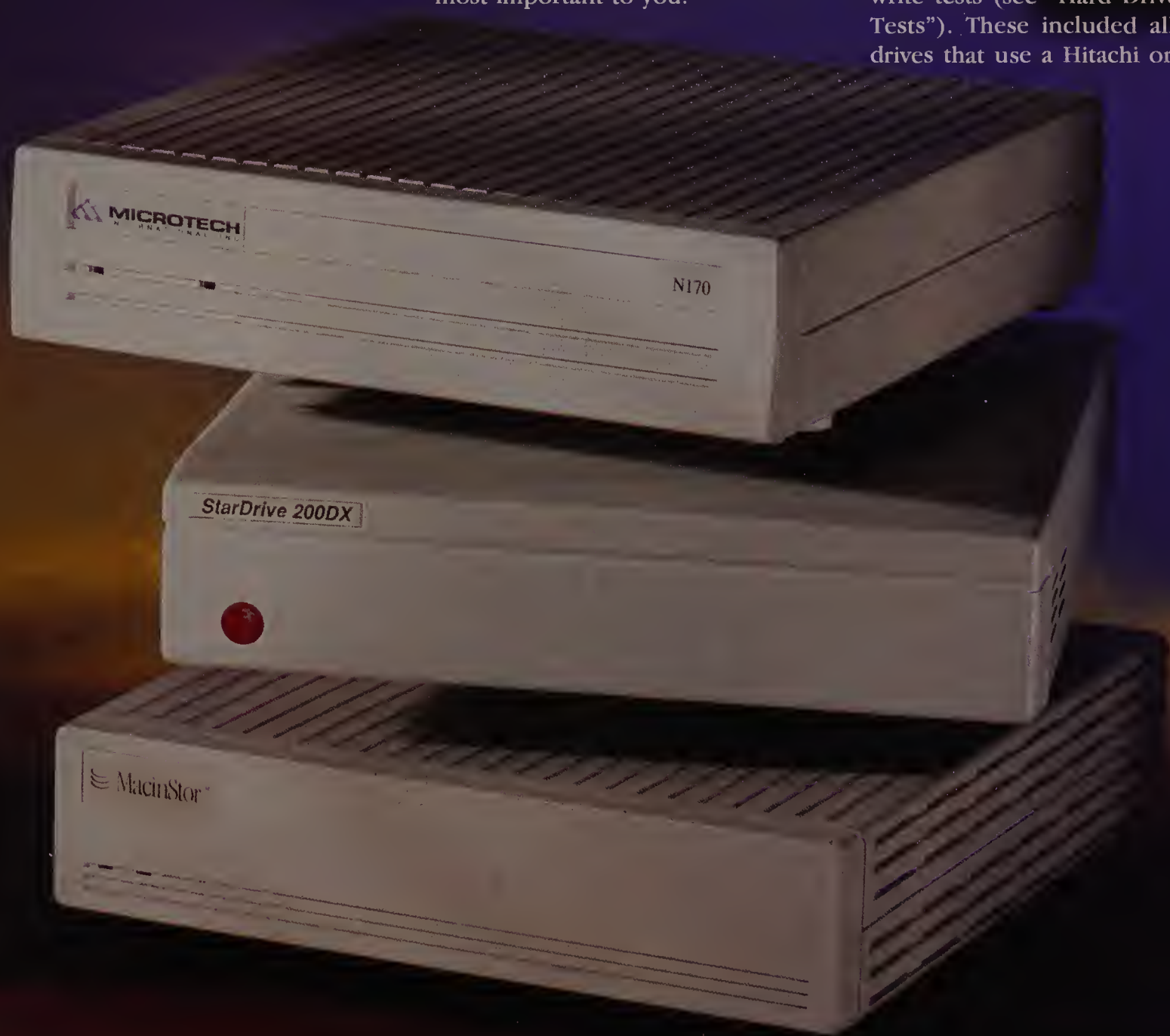
mechanism from another company, usually Quantum, Conner, or Seagate. Vendors also purchase power supplies, fans, and cables from other companies. The vendors then assemble and test the drive.

You'd think that you could just pick a drive based on what mechanism it contains and know exactly what type of performance and reliability you were buying into. Ah, if life were only that easy. The driver software (the software that makes the Mac work with the drive) that a vendor uses can affect performance, ease of use, and reliability of the drive. Components such as the fan can make a huge difference in how quietly the drive runs. The thoroughness of manuals, as well as the types of service and support provided, vary widely from vendor to vendor, and pricing schemes bounce all over the place—you can get a drive with a 210MB Quantum mechanism direct from companies such as Alliance Peripheral Systems, Club Mac, or Hard Drives International for just under $1000 or you can pay Advanced Gravis, iDS, Liberty, Microtech, or Relax another $600 or $700 for a drive with the same mechanism. (Some vendors claim that their drive is 200MB and others claim 210MB. The actual capacity depends on the formatting software.) Since no drive has everything, you'll need to sort out your priorities and then pick the drive that scores best in the categories that are most important to you.

Matching a Drive to the Mac

Before you jump to buy the fastest drive you can find, stop to consider which Mac you'll use it on. All of the drives we tested can send data much faster than the Plus can process it. Therefore, if you have a Plus you won't pay a penalty for buying a slower drive. In general, we found that drives with a Fujitsu mechanism—such as those from Jasmine, Mirror, and CMS—ran a bit slower than drives with a Quantum or Seagate mechanism. On the other hand, most of these drives are quite reasonably priced—for instance, Mirror's M180 is only $877.

The Macintosh SE and Classic have a faster SCSI port than the Plus. In fact, a few drives could not keep up with the Mac SE or Classic on our SCSI Evaluator read and write tests (see "Hard Drive Speed Tests"). These included all of the drives that use a Hitachi or Fujitsu



BY CHERYL ENGLAND SPENCER

photography by Robin Ginsberg

mechanism as well as Data Enhancements' ProDisc 170, Club Mac's Hard Disk 115, and PLI's PL 200 Turbo. Only one drive—FWB's hammer-155FMF—could send data faster than the SE/30, the Mac LC, and any member of the Mac II family other than the Mac IIfx. But as much as I appreciated the hammer155FMF's speed, and as much as I hated to send this little bullet back, I couldn't justify shelling out $3595 for the privilege of becoming a registered owner.

Compact, portable drives include the Liberty 170, Advanced Gravis Hardpac, and iDS Wip

Portability

OK, so I'm spoiled. We've always got hard drives that we've just finished testing lying around, waiting to be used. Every so often, I pick one up, load it with files from the hard drive I use every day, and take it home to do work. Since it's a bit of a walk from the office to the transit center, I generally pick the smallest, lightest drive—preferably one that fits easily into a satchel.

While working on this review, I headed for one of five drives when it came time to work at home—the Advanced Gravis Hardpac, the iDS Wip, the iDS Pro, the Liberty Systems' Liberty, or the Relax Sierra. The iDS Wip is especially compact and light—if there's such a thing as a cute hard drive, this one is it. If you stack all of these drives next to each other, the Wip looks a bit long and very skinny; the Pro is only slightly fatter (an extra inch lets it hold higher-capacity mechanisms). The stubby Hardpac is fatter and shorter than either of the iDS drives; and the Liberty and Sierra are a bit taller, wider, and heavier than the others.

The Liberty has an excuse for being a tad overweight when compared to its svelte neighbors. It's the only one of these drives that contains an internal power supply and a fan. The Wip, Pro, Sierra, and Hardpac all draw power from a Mac's floppy port. If you own a Mac II (which doesn't have a floppy port), then you need either an external power supply or an adapter. Relax includes a power supply with its Sierra drive; Advanced Gravis and iDS offer a power supply as a rather expensive option ($155 for the power supply from Advanced Gravis; $95 for the one from iDS).

Advanced Gravis and iDS also offer an optional adapter board for the Mac II series. Both companies' adapter boards must be installed in a NuBus slot, and both boards cost at least half of what an external power supply does. Installing the board isn't hard, but it is a kludgy solution, especially if you plan to use the drive on different Mac II machines.

On the positive side, drives that take their power from the Mac's floppy port are easy to travel with overseas. In Europe, all power outlets provide 220 volts, but in the U.S. they provide 110 volts. Since all Macs except the Plus and older SEs contain universal power supplies that automatically adjust to the proper voltage, you won't have to worry about damaging the power supply should you take your drive to Europe.

Most drives that include an internal power supply also use one that works with different voltages. Some of these are self-adjusting; others require you to flip a switch to set the voltage on the drive's power supply so that it coordinates with the voltage of the power outlet. The compact Liberty drive does not include a universal power supply, although Liberty will substitute one for $50 extra.

Drives of Different Sizes

While they aren't quite as totable as the Hardpac, Wip, Pro, Liberty, or Sierra, La Cie's Tsunami and Cirrus and Optima's MiniPak are still small enough and light enough to be carried easily. (La Cie offers users a carrying case for the Cirrus and Tsunami drives for $39 and Optima offers one for the MiniPak for $25.) With their vertical design, the Cirrus, Tsunami, and MiniPak take up very little desk space when placed next to a Mac. The Tsunami and Cirrus drives are notable for their modern design, and if you buy more than one, you can place them horizontally and snap them together so that they form a solid stack. The MiniPak is also nicely designed, but it tends to wobble when placed vertically, even though that is the way Optima intends it to be placed.

Most of the other drives are designed to fit neatly under a compact Mac such as the Classic or SE. If you use a Mac II–class machine or an LC, however, and you opt for one of these rectangular drives, make sure that it can run while sitting vertically; otherwise, the drive takes up too much desk space. Although many drives can run while sitting either horizontally or vertically, only the Optima DisKovery, PLI PL Turbo, Procom MD Series, and EMac Metro include removable feet that balance the drive and give the fan enough clearance to work properly no matter which position it runs in.

Termination Blues

Other than physical size, you should also check out a drive's termination. The first and last peripherals attached to a Mac should be terminated to prevent signal noise on the cable. Some drives come with terminators installed inside the case—you can usually remove these internal terminators easily, but it does require some extra work. Also, these internal ter-

MACWORLD MW LAB

Hard Drive Speed Tests

Percent slower than fastest

- 0%–10%
- 11%–20%
- 21%–29%
- 30% or more

The Mac SE's SCSI port can transfer data at a rate of 6717 kilobits per second (kbps). According to our SCSI Evaluator tests, several drives could not keep pace with the Mac SE during data reads and writes. Nearly all of the drives, however, are slower than either the Mac SE/30 or the Mac II family's SCSI port, which is rated at 11,469 kbps. We also performed a seek test to find out how long the drive's head takes to move to a specific sector.

On the application tests, we tested each drive's ability to duplicate a large (3.2MB) file and search a database for a specific record. We also averaged the drives' speeds for opening and saving files from several applications including PageMaker and Excel.

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and SCSI Evaluator low-level tests. To determine the ranking, we indexed overall performance numbers against the fastest drive. Thus, the speedy FWB hammerFMF gets a 1.00 and the slow CMS Platinum 130 (F) gets a 0.55. Indexed numbers are listed next to the product name.

	Overall Fastest	Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	SCSI Evaluator Read (in kbps)	SCSI Evaluator Write (in kbps)	Seek (in MS)
1.00	FWB hammer FMF 155 (S)	50.73	68.54	41.10	51.83	14,478	12,366	13
0.90	GCC UltraDrive 175s (S)	54.89	67.39	43.05	49.85	10,750	10,791	19
0.90	PLI PL 200 Turbo (Q)	64.52	66.39	42.94	49.58	10,686	9403	15
0.89	APS Alliance 210 (Q)	64.79	66.82	43.96	49.72	10,665	9422	15
0.88	Club Mac Hard Disk 170 (Q)	70.18	67.95	34.70	50.22	8924	8675	16
0.87	Microtech Nova 200 (Q)	67.67	67.43	44.94	50.54	10,610	8681	15
0.86	FWB hammerFMF 170 (Q)	60.35	68.45	45.47	50.32	9005	8688	15
0.86	Deltaic Server 170 (S)	64.48	70.53	42.77	51.78	10,844	9503	19
0.85	Third Wave 200X (Q)	72.90	65.31	42.85	49.56	8575	8509	16
0.85	Total Peripherals 170X (Q)	51.99	69.69	47.11	50.82	8115	7843	15
0.85	Third Wave 170X (Q)	71.26	66.62	45.23	50.74	9082	8595	15
0.85	Third Wave 120X (Q)	71.72	67.10	45.84	50.46	9007	8617	15
0.84	APS Alliance 170 (Q)	71.18	68.52	44.79	50.23	9047	7909	15
0.84	MacTel Index 200 (Q)	76.14	65.91	44.64	49.54	8145	8092	15
0.84	MacTel Index 170 (Q)	72.61	67.04	45.17	50.00	9040	7666	15
0.84	La Cie Cirrus/Tsunami/ZFP 120 (Q)	71.64	69.07	46.73	50.73	8748	8496	15
0.84	EMac Metro 170 (Q)	72.27	69.00	45.15	50.16	8492	7852	15
0.84	APS Alliance 120 (Q)	73.35	68.77	45.69	49.99	8997	7553	15
0.84	Liberty 170 (Q)	70.88	68.75	46.79	50.47	8758	7676	15
0.84	La Cie Cirrus/Tsunami/ZFP 170 (Q)	71.38	69.17	46.88	50.92	9083	8673	16
0.83	MacProducts Magic 170 (Q)	72.04	67.23	47.08	50.33	9075	8573	16
0.83	Microtech Nova 120 (Q)	72.91	68.84	46.35	51.25	8915	7404	14
0.83	Microtech Nova 170 (Q)	71.68	69.34	46.62	50.98	8889	7860	15
0.83	Club Mac Hard Disk 200 (Q)	75.30	65.83	43.13	49.42	7108	7019	15
0.83	MacLand 170 (Q)	72.30	69.16	47.02	50.83	8978	7315	15
0.82	MacLand 120 (Q)	72.07	69.20	46.69	51.16	8907	7363	15
0.82	Advanced Gravis Hardpac 210 (Q)	76.47	67.33	44.07	50.09	7322	7239	15
0.81	La Cie Cirrus/Tsunami/ZFP 200 (Q)	76.99	67.08	43.95	50.04	7089	7117	16
0.81	Storage Dimensions MacinStor 195 (M)	78.08	71.35	45.40	48.41	8368	6334	16
0.81	Jasmine DirectDrive 180 (Q)*	78.21	69.06	45.12	50.93	6954	6934	15
0.81	HDI PowerDrive 200 (M)	75.40	86.24	50.55	66.72	11,881	9594	16
0.81	Rodime Cobra 210 (R)	71.10	72.88	48.10	50.47	8705	7717	18
0.79	DJK Macintosh Stackable 200 (M)	44.53	86.94	51.83	66.93	9201	6929	16
0.77	Ehman Swift 165 (S)	79.63	71.41	46.29	51.47	7109	6549	17
0.77	Cutting Edge Swift 165 (S)	79.90	71.91	45.81	51.54	7095	6534	17
0.77	Club Mac Hard Disk 120 (Q)	97.70	66.89	43.77	49.82	5123	5385	15
0.76	Data Enhancements ProDisc 170 (Q)	89.06	68.01	43.35	50.17	5258	5265	16
0.76	PLI PL 200 Turbo (C)	86.93	74.29	48.12	48.89	6346	6051	17
0.75	Procom MD200 (R)	83.35	70.95	49.25	49.51	8098	4161	19
0.75	Ruby StarDrive 160DX (S)*	87.71	71.39	47.91	50.47	7413	4089	17
0.73	iDS Wip 120 (C)	87.57	76.89	58.19	50.46	6760	6736	18
0.73	iDS V.S.P. 200 (M)*	82.43	88.81	52.08	67.91	9187	7027	16
0.71	SuperMac DataFrame XP200 (M)	85.95	87.28	52.24	67.09	8319	6328	16
0.68	GCC UltraDrive 200 (H)	82.70	77.54	57.11	55.18	6481	4022	19
0.67	CMS Platinum 150 (S)	91.03	92.45	52.75	70.06	7131	6174	19
0.64	Dptima DisKovery 200 (H)	95.21	94.50	57.76	74.77	6472	6431	19
0.64	Ruby StarDrive 200DX (H)*	97.20	94.66	57.03	74.13	6014	5969	18
0.64	Liberty 250 (H)	97.26	94.11	56.85	74.29	6093	6050	19
0.63	PLI PL 250 Turbo (H)	96.54	94.66	57.90	75.01	6043	6003	19
0.62	Optima MiniPak 130 (F)	106.25	84.04	61.25	58.86	4982	4923	24
0.62	Mirror M180 (F)	106.27	82.96	59.84	57.93	5008	4552	25
0.61	Jasmine DirectDrive 130 (F)	107.32	86.38	62.40	59.54	4936	4732	25
0.60	Toshiba MacKit 140 (T)	87.62	91.56	55.26	69.27	7820	7833	NA
0.60	Relax Hard Plus 180 (F)	134.65	85.69	60.09	60.12	5045	4912	25
0.60	Mirror M130 (F)	119.52	83.97	62.55	58.32	4875	4364	27
0.55	CMS Platinum 175 (F)	116.20	102.04	65.90	75.25	4869	4721	25
0.55	CMS Platinum 130 (F)	118.13	103.08	66.69	75.12	4814	4747	26

*Current models ship with different mechanisms.

VITAL STATISTICS

Company	Product	Dimensions (h × w × d, in inches)	Drive Placement [1]	Case Construction [2]	Universal Power Supply	Number of Auxiliary Power Outlets	Connectors (number of pins)	Termination [3]
Advanced Gravis	Hardpac	2 × 4.5 × 7	H/V	P	NA [5]	0	25	I
Alliance Peripheral Systems	Alliance Drive	3.25 × 10 × 10.5	H/V	M	● [5]	0	50	E, I
Apple Computer	Apple Hard Disk SC	3.1 × 9.7 × 10.5	H	P	●	0	50	E
Club Mac	Hard Disk	2.5 × 10 × 10	H	M	●	0	50	I
CMS Enhancements	Platinum	2 × 10 × 10.5	H	M	●	0	50	I
Cutting Edge	Swift	2.5 × 9.75 × 10	H/V	M	●	2	50	I
Data Enhancements	ProDisc	3 × 10 × 10	H	M	●	0	50	I, (E [6])
Deltaic Systems	Server	2.3 × 9.7 × 9.7	H/V	M	●	0	50	E
DJK Development	Macintosh Stackable	3.5 × 10 × 11	H	M	●	0	50	E
Ehman	Swift	2.5 × 9.75 × 10	H/V	M	●	2	50	I
EMac	Metro	2.8 × 9.7 × 10.7	H/V	P	●	0	50	E
FWB	hammerFMF	2.25 × 9.5 × 9.75	H/V	M	●	0	50	E
	PocketHammer	6.5 × 3 × 9	H/V	M	●	0	50	E
GCC Technologies	UltraDrive	2.75 × 9.5 × 10.75	H	P	●	0	50	E
Hard Drives International	PowerDrive	2.5 × 9.75 × 9.75	H	M	●	0	50	I
iDS Systems	Pro	2 × 5 × 8	H/V	P	NA [5]	0	50	I
	Veloce	2 × 9.6 × 10.6	H	P	●	2	50	E
	V.S.P.	2 × 9.6 × 10	H	P	●	0	50	E
	Wip	1 × 5 × 8	H	P	NA [5]	0	50	I
Jasmine	DirectDrive	2 × 9.5 × 10.5	H/V	P	●	2	50	I
La Cie	Cirrus	6.5 × 3 × 9.25	H/V	P	●	0	25	S
	Tsunami	6 × 2.25 × 8.75	H/V	P	●	1	25	S
	ZFP	2.4 × 9.75 × 9.75	H	M	●	1	25	S
Liberty Systems	Liberty	2 × 5 × 7	V	M	○ [6]	0	25	I
MacLand	MacLand	2.75 × 9.75 × 10	H	P	●	0	50	I
MacProducts USA	Magic	2.5 × 9.5 × 10	H	M	●	3 [6]	50	E
MacTel	Index	2.25 × 9.5 × 9.75	H	M	●	0	50	I
Microtech International	Nova	2.5 × 9.7 × 10.5	H	P	●	1	50	I
Mirror Technologies	M Series	2.5 × 9.7 × 10.8	H/V	M	●	2	50	E
Optima Technology	MiniPak	2.5 × 6.2 × 7.8	H/V	P	●	0	50	E
	DisKovery	2.5 × 11.4 × 10.2	H/V	P	●	0	50	E
PLI	PL Turbo	2.4 × 9.8 × 9.8	H/V	M	●	0	50	S
Procom Technology	MD Series	2.25 × 9.7 × 10.25	H/V	P	●	0	25	S
Relax Technology	Hard Plus	2.5 × 10.1 × 11.1	H	M	●	3	50	E
	Sierra	5.5 × 2.1 × 7.8	H/V	M	NA [5]	0	50	E
	Vista	2.5 × 10.1 × 11.1	H	M	●	0	50	E
Rodime Systems	Cobra	2.4 × 9.7 × 10.4	H/V	P	●	2	50	I
Ruby Systems	StarDrive DX	2.25 × 10 × 10.5	H	M	●	1	50	I
Storage Dimensions	MacinStor ZFP	3 × 9.7 × 10	H/V	M	●	0	50	E
SuperMac Technology	DataFrame XP	8 × 3 × 9.5	V	M	●	0	50	I
Third Wave Computing	Third Wave X	2.5 × 9.75 × 9.75	H	M	●	0	50	I
Toshiba	MacKit	4.75 × 9.5 x10	H	M	●	0	50	E
Total Peripherals	Total Peripherals X	3 × 10 × 10.5	H	M	●	0	25	I

● = yes; ○ = no. [1] H = horizontal, V = vertical. [2] P = plastic, M = metal. [3] E = external, I = internal, S = switchable. [4] NT = Unit not tested for sound level.

minators get bent easily while you're removing them. Internally terminated drives are best suited for users who plan to have just one peripheral attached to the Mac's SCSI port and who don't plan to move the drive to other Macs.

More and more vendors are supplying external terminators (50-pin connectors) with their drives. These terminators attach between the Mac's SCSI port and the SCSI cable. You'll want external termination if you have (or plan to purchase) several SCSI peripherals, if you move the hard drive to another Mac frequently, or if you're working on a Mac IIfx. (The Mac IIfx includes a special terminator that you must use instead of the standard external terminator.)

The best termination solutions,

Software Included	Partitioning Software Included	Password Protection Software Included	Capacity/Mechanism/Sound level [4]/Price
Advanced Security	●	●	210/Q/42dB/$1595
Redux	●	●	120/Q/42dB/$699; 170/Q/44dB/$829; 200/M/NT/$959; 210/Q/44dB/$959
HD Backup	●	○	160/Q/NT/$2699
none	●	○	115/Q/44dB/$679; 165/Q/44dB/$819; 210/Q/42dB/$929
SUM II	●	●	130/F/49dB/$1639; 150/S/50dB/$2249; 175/F/49dB/$1999
HDD Backup & Restore	●	○	165/S/40dB/$1659
SCSI Commander	●	●	170/Q/41dB/$1059
none	○	○	170/S/45dB/$1299
SCSI Commander	●	●	200/M/41dB/$1249
HDD Backup & Restore	●	○	165/S/40dB/$849
Norton Utilities, HD Backup	●	●	170/Q/42dB/$1769
Hard Disk Deadbolt, Hard Disk Util, HD Backup	●	●	155/S/NT/$3495
Hard Disk Deadbolt, Hard Disk Util, HD Backup	●	●	170/Q/43dB/$1795
SUM II, QuickSpool II, QuickEnvelope	●	●	75/S/47dB/$1599; 200/H/44dB/$1699
none	●	●	200/M/43dB/$979; 210/Q/NT/$899
HD Backup	○	●	200/C/NT/$1545; 200/Q/NT/$1545
HD Backup	○	●	200/C/NT/$1595; 200/Q/NT/$1595
HD Backup	○	●	200/C/NT/$1595; 200/Q/NT/$1595
HD Backup	○	●	120/C/42dB/$959
SUM II [7]	●	●	130/F/43dB/$669; 180/F/NT/$869
Norton Utilities, Serialtalk, HD Backup	●	●	120/Q/46dB/$949; 170/Q/47dB/$1149; 200/Q/44dB/$1249
Norton Utilities, Serialtalk, HD Backup	●	●	120/Q/46dB/$999; 170/Q/47dB/$1199; 200/Q/44dB/$1299
Norton Utilities, Serialtalk, HD Backup	●	●	120/Q/46dB/$899; 170/Q/47dB/$1099; 200/Q/44dB/$1199
HD Backup	●	●	170/Q/NT/$1299; 200/Q/NT/$1399; 250/H/48dB/$1799
Smart Image & Restore	●	○	120/Q/42dB/$699; 170/Q/42dB/$829
HD Backup	●	●	170/Q/42dB/$859
AutoSave, Backmatic	●	●	170/Q/46dB/$919; 210/Q/41dB/$1039; 180/S/NT/$1069
Norton Utilities, Total Recall	●	○	120/Q/40dB/$1249; 170/Q/39dB/$1499; 200/Q/41dB/$1699
QuicKeys Lite, DiskTop	●	●	130/F/40dB/$747; 180/F/43dB/$877
MockPackage Plus Utilities, Gofer, Volume Backup			
DiskMount, Multilevel Mirroring	●	●	130/F/44dB/$1295; 200/H/NT/$1995
DiskMount, Multilevel Mirroring	●	●	130/F/NT/$1295; 200/H/45dB/$1995
TurboSpool, TurboOptimizer, TurboBack	●	○	200/Q/45dB/$1599; 200/C/43dB/$1599; 250/H/45dB/$1799
Virex, 911 Utilities	●	●	200/R/43dB/$1995
HD Backup	●	●	180/F/47dB/$1299; 200/S/NT/$1479; 210/Q/NT/$1499
HD Backup	●	●	180/F/NT/$1299; 200/S/NT/$1399; 210/Q/NT/$1429
HD Backup	●	●	180/F/NT/$1229; 200/S/NT/$1419; 210/Q/NT/$1429
Redux	●	●	210/R/45dB/$2549
HD Backup	●	●	160/Q/NT/$1559; 200/C/NT/$1899
MacTools Deluxe	●	●	205/M/41dB/$2179
SuperLaserSpool, SuperSpool, DiskFit	●	●	200/M/43dB/$2099
Fontina	●	●	120/Q/39dB/$799; 170/Q/42dB/$939; 210/Q/38dB/$1099
none	●	○	140/T/45dB/$1495
HD Backup	○	○	170/Q/NT/$1299

[5] This drive takes its power from the Mac via the floppy port. [6] This feature is optional. It will cost extra. [7] SUM II and Virex are sold as options for $30.

however, come with drives from La Cie, Procom, and PLI. All of these companies include switches on the back of the drive for setting termination. You don't have to worry about losing an external terminator or removing internal ones. Also, even though Apple says to terminate the first and last SCSI peripherals, this scheme isn't foolproof. Sometimes peripherals won't work unless the terminators are placed differently. For instance, you may need to remove the last terminator in a chain. In times like these, you'll be glad that changing your hard drive's termination is as easy as flipping a switch. Drives from La Cie and PLI contain a bank of DIP switches, which you set in a specific pattern depending on whether you want to terminate the drive or not.

For a good bargain, check out the Mirror M Series, Third Wave, and Hard Drives International PowerDrive.

The Procom MD Series includes one recessed on/off switch, which is much easier to set.

The Software Factor

All of the drives include basic formatting and diagnostic software. If you are an experienced Macintosh user, you'll be able to get any of these drives up and running. But if you are new to the Mac, installing a hard drive for the first time, or just want a bit of elegance in the software you use, then you need to know which vendors provide the best utility software.

Some of the most direct and logical software comes from La Cie, Rodime, Storage Dimensions, and SuperMac. Drives from DJK Development, Data Enhancements, and Club Mac also include one of the better pieces of work—DJK's SCSI Commander. Although not as graceful as the software from Storage Dimensions, SCSI Commander is logically organized and even includes a utility similar to SCSI Evaluator (the utility Macworld Lab uses to test a drive's read, write, and seek times) for performing your own benchmarks on drives.

The software that comes with MacTel's drives has one of the nicest-looking interfaces in the bunch. The software sports a 3-D cursor and 3-D buttons and includes color and sound. If you click on an item, a pop-up balloon appears, giving you help. MacTel's software is both intuitive and extremely easy to use.

Numerous vendors include handy file- and disk-recovery utility software such as SUM II, The Norton Utilities for the Macintosh, 911 Utilities, or MacTools Deluxe with their drives. I don't consider these programs to be unnecessary frills or marketing gimmicks—any Macintosh user would be wise to own one or more of the three. Jasmine offers SUM II to its customers for a reduced price of $30.

Some vendors also include the proven backup packages DiskFit (SuperMac), Redux (Alliance and Rodime), and MacTools Deluxe (Ruby Systems). (Most vendors, however, include Apple's HD Backup utility—a bare-bones program that is quite awkward to use.) Other vendors include software that they have designed in-house. For instance, PLI includes spooling and disk-optimizing software and Advanced Gravis includes its own security program. Optima includes mirroring software that copies every action you perform to two hard drives at once (assuming, of course, that you are lucky enough to have an extra hard drive just for backup). While the software supplied can sway your decision between a few otherwise comparable choices, it shouldn't be the first feature you consider.

The Best Manuals

As with software, experienced users may not care about manuals. If you already understand termination, interleave, and other arcane issues, you may not even give a second thought to the manual. But many users will appreciate a bit of explanation.

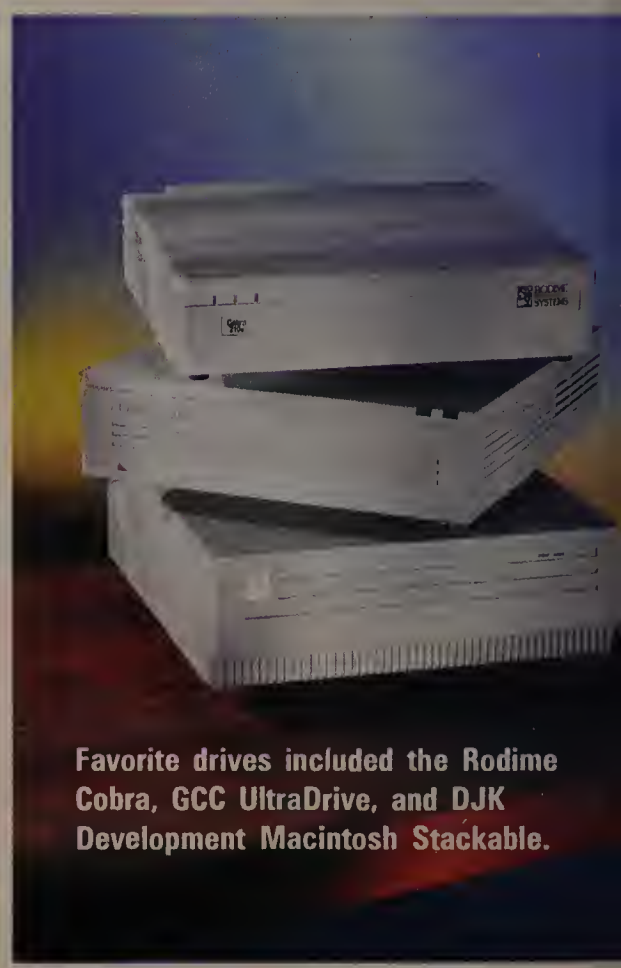
Among the better manuals are those from GCC, SuperMac, Mirror, MacTel, Optima, Storage Dimensions, SuperMac, and Jasmine. They all provide information about both the drives and the software in a clear, concise manner. Manuals from GCC, Optima, Storage Dimensions, and SuperMac are especially slick and well illustrated.

Other companies, such as MacProducts and Club Mac, don't even include a manual with their drives. Instead they enclose a mimeographed sheet with a bare minimum of instructions on how to set the SCSI ID. Data Enhancements puts its manual on a floppy disk in an effort to help our environment, but I couldn't use the manual well by reading it on screen and ended up printing the whole document.

Technical Support

Technical support is something you don't think about until you need it. But when you do need it, you'd better hope it's good. All hard drive vendors offer at least a one-year warranty on drives, and the standard is creeping up to two years. Microtech offers an outstanding five-year warranty on its hard drives. Other companies sell extended warranties for the years after the original warranty expires.

If your drive breaks, most companies claim that they will repair or replace it within two or three days, not including shipping time. (We could not test these claims, but keep reading Deborah Branscum's *Conspicuous Consumer* column for information on vendors who are responsive and those who aren't.) Toshiba has an extremely long turn-



Favorite drives included the Rodime Cobra, GCC UltraDrive, and DJK Development Macintosh Stackable.

around time of 30 days. Mirror and MacProducts offer an optional plan (for a yearly fee) in which the companies will loan you a hard drive while they repair your broken one. Under this plan, Mirror and MacProducts ship the loaner drive to you overnight as soon as you call. If you buy a drive through a dealer, you can frequently get the dealer to give you a replacement immediately. The dealer will then send the broken drive back to the company in exchange for a new replacement drive. Several vendors will try to recover data from a crashed disk if you ask; some charge, some do so for free. I've heard several good reports about Mirror's hard drive–repair and data-recovery services. Mirror charges based on the amount of data you need to recover. For instance, recovery of data on a full 200MB drive costs $187—a pittance if you really value the data.

The Grand Finale

The overall crowd pleasers at *Macworld* were the La Cie Tsunami and Cirrus and the Microtech Nova. These drives are reasonably priced, quick, and come with a nice assortment of software. Microtech's quiet Nova comes with a lengthy five-year warranty; La Cie offers a respectable two-year warranty.

If you just want a basic drive and don't want to pay any more than you have to, then I recommend the drives from any of the low-price leaders: Alliance Peripheral Systems, Club Mac, Hard Drives International, Jasmine, MacLand, MacProducts, Mirror, and Third Wave. Drives from Third Wave are especially quiet. I also found the drives from Mirror to be a good bargain. Ehman normally offers some of the more inexpensive products, but in this capacity range the company uses a more expensive Seagate mechanism, thus boosting the retail price of its drives.

For portability, the iDS Wip and the higher capacity Pro are solid choices for anyone but Mac II owners. I also recommend the Liberty 170MB and 200MB drives highly—these drives maintain the smallest possible size for a drive with a power supply and a fan. The Advanced Gravis Hardpac is a close runner-up to these three, but it's a bit larger than the iDS drives and doesn't include a power supply as the Liberty does.

Finally, there's a large group of drives that I'd recommend based on aesthetics, features, and support. Most of these drives display a higher retail price than the drives from La Cie or Microtech, but you can often find them at a discounted price at a dealer's store. Among our favorites in this category are the drives from Deltaic, DJK Development, EMac, GCC, PLI, Rodime, Ruby, and Storage Dimensions.

Only a few drives made our "don't buy" list—Toshiba's MacKit, CMS's Platinum drives, the Hitachi-based Liberty 250MB, and FWB's hammer-155FMF. Toshiba's MacKit has a clunky case and is one of the slower drives. The CMS Platinum drives and the Hitachi-based Liberty 250MB were the noisiest and were also among the slowest. The hammer155FMF, while fast, is overpriced and the software is unreliable (it failed to format three different times). Generally, the quality of the midrange hard drives we tested was quite good—and that's good news for consumers. ■

See *Where to Buy* under Midrange Hard Drives for contact information.

SERVICE SUPPORT

Company	Method of Sale	Warranty (in years)	Extended Warranty Available	Repair Turnaround Time (in days)	Data Recovery on Request	Toll-free Technical Support
Advanced Gravis	dealer/direct	1	○	7–10	charge	○
Alliance Peripheral Systems	direct	2	○	2	charge	●
Apple Computer	dealer	1	○	NA[1]	○	○
Club Mac	dealer/direct	2	●	1	free	●
CMS Enhancements	dealer	1	●	2–3	○	○
Cutting Edge	dealer	2	●	5	○	○
Data Enhancements	dealer/direct	2	○	2	○	●
Deltaic Systems	dealer/direct	1	●	3	charge	●
DJK Development	direct	2	●	7–10	free	○
Ehman	direct	2	●	5	○	○
EMac	dealer	2	○	3	○	○
FWB	dealer	1	●	2	free	○
GCC Technologies	dealer/direct	2	○	2–3	charge	●
Hard Drives International	direct	1–2 [2]	○	2	○	●
iDS Systems	dealer	2	●	2	free	●
Jasmine	direct	2	●	3 [3]	○	○
La Cie	dealer/direct	5	○	3	charge	●
Liberty Systems	direct	2	○	2–3	charge	○
MacLand	direct	2	○	2	free	●
MacProducts USA	dealer/direct	2	●	2–3	free	○
MacTel	direct	2	○	1	free	○
Microtech International	dealer	5	○	2	free	●
Mirror Technologies	direct	2	●	2	charge	○
Optima Technology	dealer	1	●	1	○	○
PLI	dealer	1	●	2	free	●
Procom Technology	dealer	2	○	2	○	○
Relax Technology	dealer/direct	2	●	2	charge	○
Rodime Systems	dealer	1	○	3	○	○
Ruby Systems	dealer/direct	1	○	2	free	●
Storage Dimensions	dealer	2	○	2	○	○
SuperMac Technology	dealer	1	○	3	○	○
Third Wave Computing	dealer/direct	2	●	1–2	charge [2]	●
Toshiba	dealer	1	●	30	○	○
Total Peripherals	dealer	2	○	NA[1]	free	NA[1]

[1] To dealers only. [2] If data recovery takes less than one-half hour, there is no charge. [3] For new customers only

GREAT GRAPHICS

Winners of our third annual Macintosh art contest

This article marks the completion of the third Macintosh Masters art contest. Like a family album full of snapshots, the articles we've published recognizing the winning entries each year trace the growth of the Mac as an artist's tool.

Last year's article, for example, recorded the coming of age of two new family members: for the first time color and animated entries showed up in appreciable numbers. Mac Masters III saw both trends deepen and develop. In a single year the Mac color standard matured from 8 to 24 bits, and a far greater percentage of color entries made it to hard copy. The same story holds for animation; the trickle of obviously experimental entries last year came in almost exclusively on disk. Mac Masters III brought in a crateful of videotapes, many of which were produced for real clients.

One pronounced trend this year is that advances in image-editing software—chiefly the release of Adobe Photoshop—have sparked a fad for photo-illustration. Though surrealistic, moon-jumping cows and orbiting eyeballs remain the rule in this genre so far, a few digital photographers, like grand-prize winner David Herrold (facing page), are turning the technology to good account.

Perhaps the most significant shift this year was the sharp increase in the number of interactive works. The judges and I browsed disk magazines full of graphics, games, and even articles. Via laserdisc we wandered a Zen garden in search of a mystery woman. We rendezvoused—through the agency of CD ROM—with a digital dream date at her place for, ahem, interaction. We watched a futuristic jam session in which a musician and a visual artist controlled sounds and scenes via voice commands. We free-associated through the information in kiosk-type displays. We experimented with an "art engine" that put imagery through mathematically derived permutations.

You won't find any of these projects on the following pages, but though most are imperfectly realized, they're still worth taking note of because they mark the birth of something truly new. After all, look at the works presented here; the bulk could have been made without the Mac (albeit often with more expense and effort). Interactive art may have existed before computers, but the complexity of the interactions available via computers is unprecedented. In the dimension of interactivity, the computer artist has the opportunity to go beyond aping other media, to find something uniquely his or her own. In recognition of this, next year we plan to inaugurate a category for interactive projects, most of which have been forced to compete in None of the Above.

Judging the collection this contest brings in requires a special mix of talents; once again we drew our panel from both the computer and art worlds. Ed Catmull, a noted computer-graphics scientist and innovator, is chairman of the Academy Award–winning animation-software company Pixar. Robert R. Riley is curator of media arts at the San Francisco Museum of Modern Art. Installation and performance artist Perry Hoberman, best known as a longtime collaborator of Laurie Anderson, has exhibited extensively throughout the United States and Europe. Sharon Anderson is a former art director of *Publish* magazine. And Ron Chan is a widely published Mac illustrator.

The Mac Masters contest wouldn't have taken place without the participation of hundreds of artists around the world, or the generous support of the sponsors—Agfa Compugraphic, Adobe Systems, Apple Computer, Claris Corporation, Deneba Software, Pantone, Radius, QMS, and Truevision. On behalf of *Macworld,* I thank both groups. I hope everyone enjoys the following additions to the Mac art album. If history gives any indication, next year's event will be even more impressive; check these pages in about six months for an announcement.

BY JOE MATAZZONI

David Herrold, **FIRST PLACE AND GRAND PRIZE** / *Forest Home*

Dogs and Propane

High Speed Chase

FINE ART

FIRST PLACE AND GRAND PRIZE

Digital Collages (previous page) David Herrold likes to plan his wide-format photo collages carefully, and then abandon the plan once the creative process is under way. (Planning ensures that the perspectives in the various shots Herrold will take agree.) Using a ThunderScan and Digital Darkroom, Herrold usually begins a scene by blending four or five 35mm prints together to form a background. Some of his scenes, however—like *Forest Home*—are completely artificial. The forest in this image was made from three trees, altered and repeated; the forest floor is a cloned texture.

In the future, Herrold's photographic explorations will no longer be limited to black and white. His Grand Prize was a 32-bit Truevision Nuvista+ board, and as his prize for winning in this category Herrold chose Adobe Photoshop.

HONORS

Modern Problems New York illustrator and printmaker Scott Baldwin uses SuperPaint to produce limited-edition books of his evocative drawings.

Signs of Life Barbara Nessim relies on experience and trial and error when creating the 3-D effect in her stereo slide images. Once she has completed a design, Nessim copies it and then goes to work manually offsetting parts of the copy to make them recede or come forward when viewed in a stereo viewer. Nessim painted *Signs of Life* in Photoshop.

Who Needs Sleep? This piece is titled for the experience of making it, not the content: David Perk completed the ColorStudio collage during a 30-hour binge the weekend before a gallery show. The original color thermal printouts were tiled to yield a 5-by-7-foot work.

The Revelation This piece, created for a video in progress, combines color printouts with gouache painting on paper. Bigtwin modeled the dogs in Swivel 3D.

Bigtwin
The Revelation

Scott Baldwin
Modern Problems

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Barbara Nessim
Signs of Life

David Perk
Who Needs Sleep?

STEVE UNDERWOOD

Paul Curtin Design
Lapis Display Server Packaging
PANTONE COLOR AWARD

Reactor Art and Design
Fun with Computers
FIRST PLACE

Graffito
Full Bleed

Jim Ludtke
1991 Nintendo Calendar
PANTONE COLOR AWARD

GRAPHIC DESIGN

FIRST PLACE

Fun with Computers "We were trying to bring some humanity to the subject of computer graphics, which often seem cold and mechanical," says Louis Fishauf of this promotional poster for a computer-animation firm. Fishauf designed the piece, which includes ScanMan hand scans, entirely in Illustrator 88. Partly because of the poster's 2-by-3-foot size, the drawing was saved as PostScript, converted to Scitex format via V.I.P., and output as four-color film on a Scitex plotter. Since he has all the graphics software he needs, for his prize Fishauf chose to get organized with Claris's FileMaker Pro.

HONORS

Lapis Display Server Packaging Art director Paul Curtin and designer Peter Locke produced these eye-catching packages using Illustrator 88, PageMaker, and an Apple Scanner. As their prize for winning one of this year's two Pantone Color Awards the two men received $500 worth of Pantone Color Reference Books. The Pantone awards were started this year to recognize creative use of printed digital color.

Full Bleed Dave Plunkert, Joe Parisi, and Tim Thompson used Aldus FreeHand to produce this cover for the magazine of the Art Director's Club of Metropolitan Washington. They made scans on a Sharp JX-450 scanner, then output the entire page as four-color film.

1991 Nintendo Calendar Since the characters in the games this piece depicts are built from just a dozen or so pixels apiece, Jim Ludtke created his own interpretations rather than using screen captures. He painted most of the characters in Studio/8 and Photoshop; a few he modeled in Swivel 3D. Ludtke finalized the page designs in Photoshop, adding glows and other effects, and then saved the completed files in TGA format. To achieve the piece's Pantone award–winning color, Ludtke sent the TGA files to a service bureau, which used a film plotter to produce them as 8000-line, 4-by-5-inch transparencies.

Graffito, Joe Parisi / *Design Reach brochure* (not shown)

Studio MD, Jesse Doquilo, Glenn Mitsui / *AIGA Currents Display Brochure* (not shown)

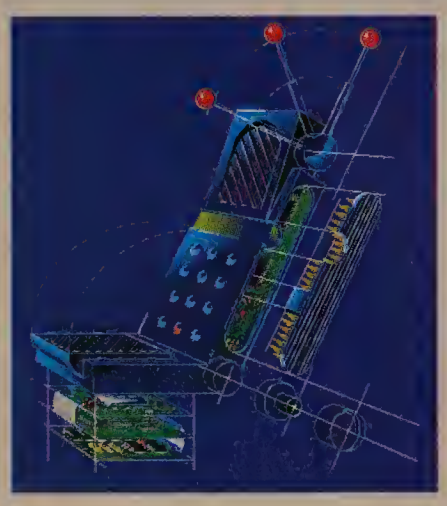
TECHNICAL ILLUSTRATION AND RENDERING

HONORS

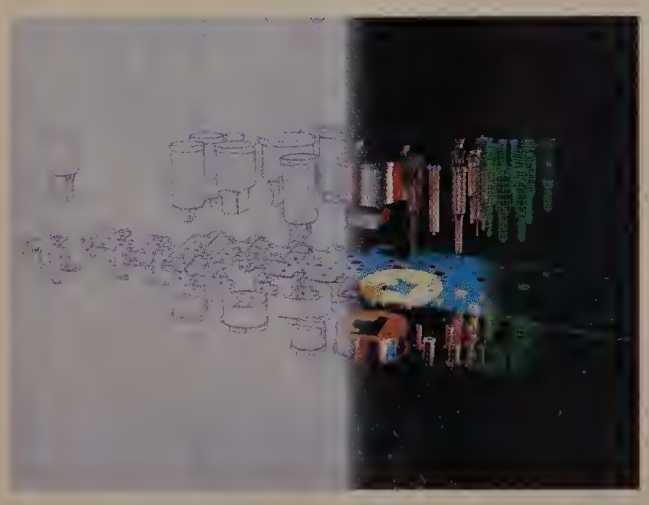
Cellular Design David Rumfelt used UltraPaint to render this conceptual drawing, which was based on a design by Bob Rauchman.

Dayton Progress Punches Tony Mantia imported Scitex scans of the blueprint and punches directly into Photoshop, where he composited them with FreeHand-drawn wire frames. He saved the completed design in Scitex format, and output four-color film at poster size from a Scitex Raystar.

Theodore G. Huff / *Femur Lengthening Device* (not shown)



David Rumfelt
Cellular Design



Zebra Electronic Design Studio
Dayton Progress Punches

ANIMATION

FIRST PLACE AND GRAND PRIZE

Domestic Blitz The adventures of three archetypical cartoon figures—dog, cat, and mouse—*Domestic Blitz* cleverly mixes Mac-generated character animation with video backgrounds. Jim Ludtke modeled the story's mismatched roommates in Swivel 3D. To position the animation in relation to the backgrounds, Ludtke exported the Swivel frames to MacroMind Director, where he could match them up against live video piped in via a Computer Friends' TV Producer Pro video board. To composite the animation and video, Ludtke simply played the Director movies with a transparent background color on top of the video sequences; using the Computer Friends board again, he ported the NTSC signal directly to tape. Michael Whiteley composed the piece's suitably wacky music in

Cathy Malkasian
An Argument in the Art World

Jim Ludtke
Domestic Blitz
FIRST PLACE AND GRAND PRIZE

Mark of the Unicorn's Performer software; Christopher Cave did the editing on Interactive Media Technologies' Mac-based system.

Ludtke's Grand Prize is a 32-bit Truevision NuVista+ board; he chose Adobe Illustrator 3.0 as his category prize.

HONORS

An Argument in the Art World Cathy Malkasian painted these café confreres in PixelPaint Professional; bringing them to belching, bickering life with MacroMind Director. A graphics tablet helped achieve the piece's soft, nondigital look.

Carl B. Stone
Special Effects
FIRST PLACE

3-D AND IMAGE SYNTHESIS

FIRST PLACE

Special Effects Creative director Carl B. Stone and his team at Apple—John Lasala, Dean Foster, and Larry Stead—had a little over two months to produce this show-stopping, 90-second fly-through tour of a IIfx for Apple's introduction of the computer last March. The team did most of the 3-D modeling on Macintoshes equipped with Symbolics' MacIvory hardware and software, which together turn a Macintosh into a Symbolics workstation. Because of the short lead time, some of the more complex objects were modeled on actual Symbolics 3650s. The rendering was all Mac, however—accomplished on a distributed network of 18 MacIvory-equipped Mac IIs.

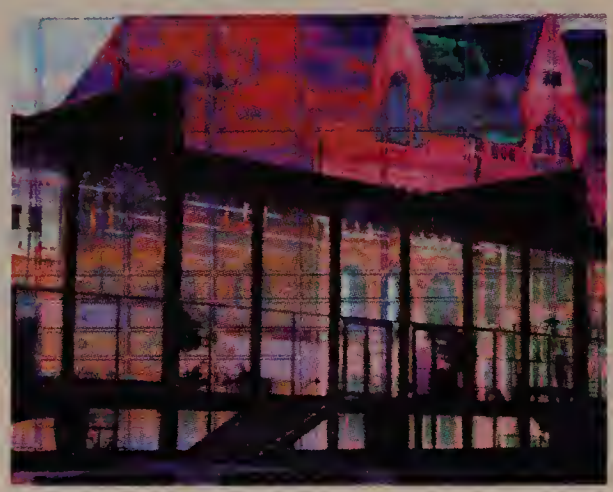
Hideaki Ebata
Dish-Nippon

For winning the Image Synthesis prize, Stone chose—what else?—Adobe's Stone font family.

HONORS

Dish-Nippon Hideaki Ebata used System Soft's Shade, a 3-D program available in Japan but not yet in the United States, to model and render this still life.

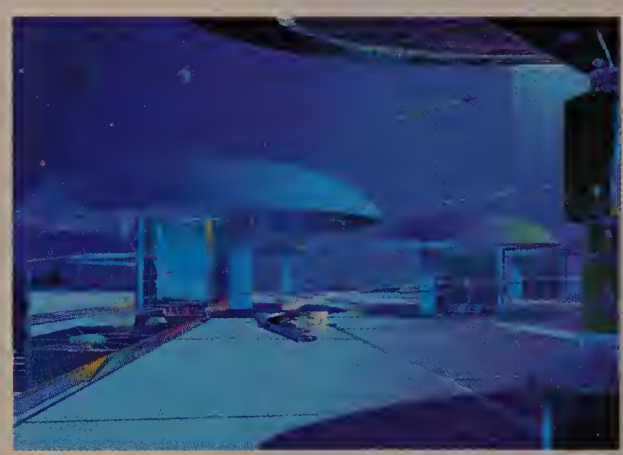
Darrel Anderson / *Venus Prime*
(not shown)



James Haney
Crown

Robyn Miller
The One Who Knows God
FIRST PLACE AND GRAND PRIZE

John Hersey
Shoemandingo



Landor Associates
Megalopolis

ILLUSTRATION

FIRST PLACE AND GRAND PRIZE

The One Who Knows God Robyn Miller drew this elegant FreeHand illustration for the cover of a book of writings by third-century Christian theologian Clement of Alexandria. Although graphics first brought Miller to the Macintosh, he is now chiefly interested in software design. His work in that area will be familiar to fans of the whimsical interactive adventures The Manhole and Cosmic Osmo. Miller's grand prize was a QMS ColorScript 100 Model 10 printer. For taking first place in Illustration, Miller selected Adobe Photoshop.

HONORS

Shoemandingo "It's about a robot who has a fascination with shoes and shopping for shoes," explains John Hersey of his FreeHand illustration. We knew that.

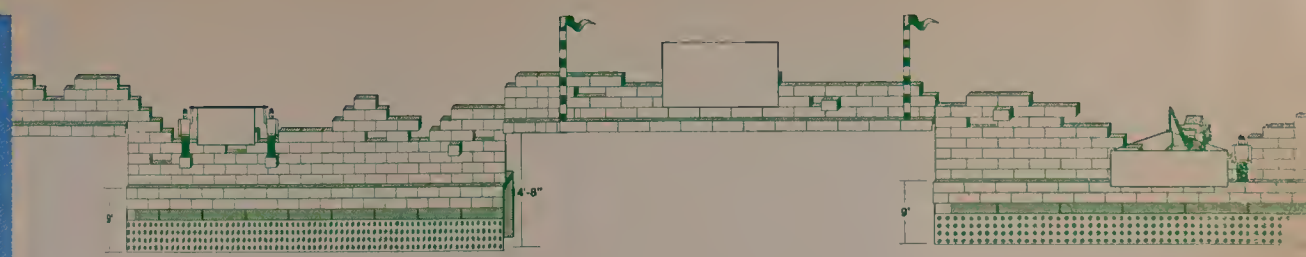
Megalopolis Antonio Angulo painted this glowing scene entirely in Photoshop for part of an exhibition design proposal on the theme of Cities of the Future.

Crown James Haney composited images of two buildings from his alma mater, the Illinois Institute of Technology, in Chicago, to create an illustration for a poster celebrating the school's 100th anniversary. He performed various mathematical manipulations on the photographs in custom software, and then adjusted the colors and separated the final image in Photoshop.

Vincent Wai / *Warbird* (not shown)

Sharon Steuer / *Kolokolo Bird* (Not shown)

Brian Hill
Chicago Title and Trust Barricade
FIRST PLACE



NONE OF THE ABOVE

FIRST PLACE

Chicago Title and Trust Barricade Brian Hill drew the designs for this traffic barricade in Aldus FreeHand. He easily created comps for approval by printing color versions and gluing them to cardboard. Hill chose Adobe Photoshop for his prize.

HONORS

Tri-Avian David C. Roy designs his limited-edition kinetic sculptures—which run for hours on the power of something called negator springs—in Illustrator 88. To visualize his creations' complex motion before rendering them in wood and brass, Roy creates animated prototypes using Swivel 3D and MacroMind Director.

Sound Sculpture In the "auditory environments" of composer, instrument maker, and hardware designer Trimpin, electromechanically controlled instruments surround audiences with pulsing, resonating waves of music. Trimpin designed and built a special MIDI adapter to enable a Mac running Professional Composer to pluck, pound, and otherwise play his custom-made and modified acoustic instruments with a sensitive touch and a variety of dynamics. M

SETH RESNICK

David C. Roy
Tri-Avian

DALE WINDHAM

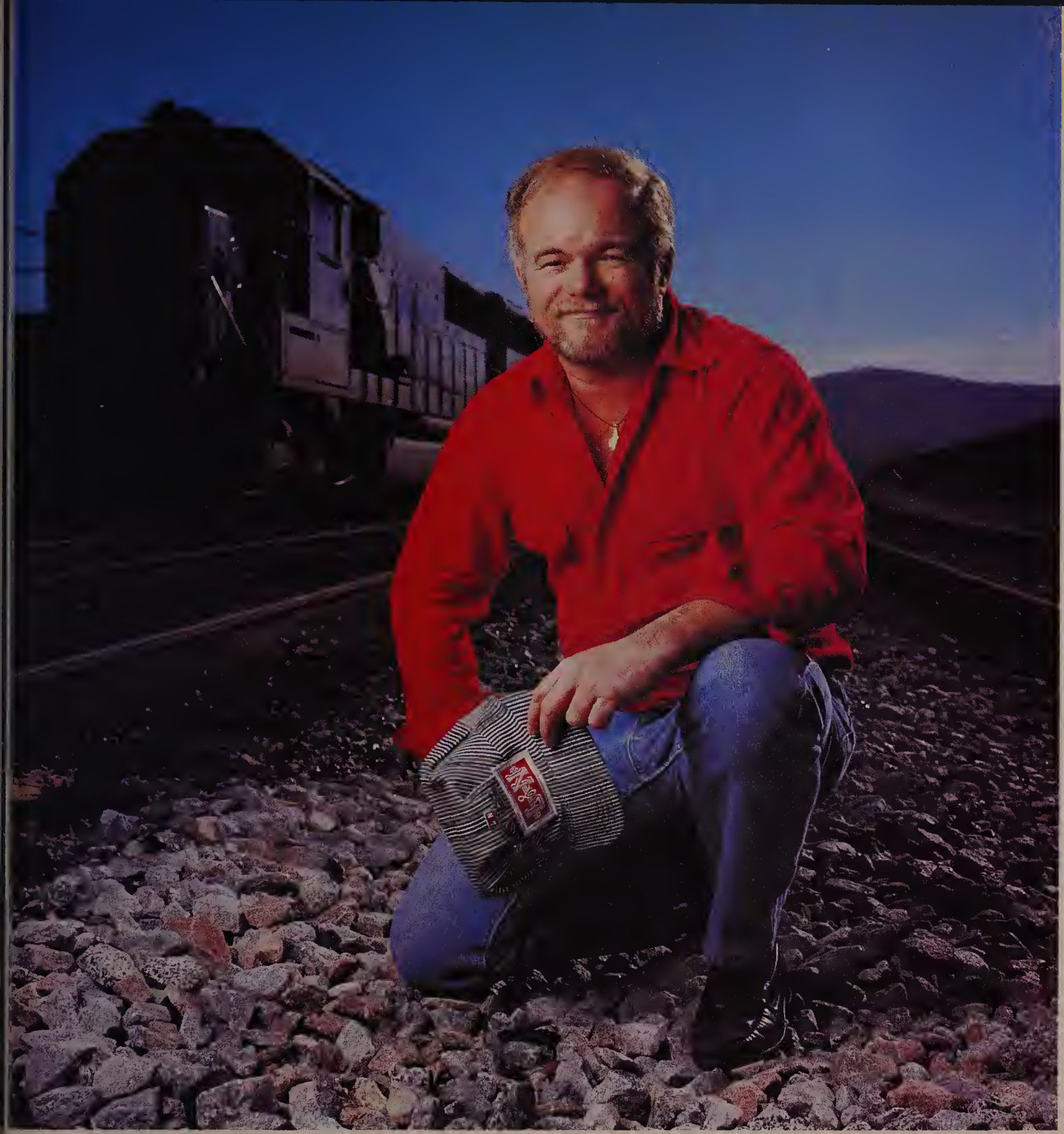
Trimpin
Sound Sculpture

MONEY MANAGEMENT CURES

YOU'RE A COMPETENT, SMART PERSON—BUT YOU STILL HAVEN'T GOTTEN A GRIP ON YOUR PERSONAL FINANCES. HELP IS ON THE WAY.

Almost everyone has some sort of problem with money, whether it's a supposedly simple chore like balancing a checkbook or a more complex task like tracking a varied portfolio of investments. Paying taxes can become quite painful as you struggle to fill out all the proper forms (in ink, no less). Thankfully, a wide variety of personal finance programs exist to help you budget, write checks and organize your checkbook, and track your assets and debts. There are even programs to help you through the happiest time of the year—the days when you prepare federal and state tax forms. ■ Some of these finance programs take you beyond basic money management. High-end investment programs let you analyze and track investments, calculate how much monthly payments on loans will be, and figure out how much you can pay for a house. There's even a program to record and analyze gas and electric bills. **Checks and Balances** The simplest (and often most useful) personal finance programs are the bare-bones electronic checkbooks, Intuit's Quicken and Aatrix's CheckWriter II. With these programs, you can easily call up an electronic check on your screen, enter the data, and then print the check (or store it in a queue and print several checks at once). Deposits or cash withdrawals are handled in a similar manner, using simple electronic forms that resemble deposit slips or withdrawal forms. ■ Quicken and CheckWriter II shine in ease of use; if you're not an analytical type who likes to pore over

BY ALAN L. SLAY



TOM ROGOWSKI

Tracking Personal Records A locomotive engineer for CSX Transportation, Ricky Hamilton uses Nolo Press's For the Record to organize his personal records. Hamilton used to stuff important papers (such as insurance policies, medical records, and loan agreements) into two filing cabinets; he couldn't find what he needed quickly. "Now one little disk has information on everything we own," says Hamilton. And, in case his house burns down, Hamilton keeps a backup copy of the disk in a safe-deposit box at the bank.

the fine details of your finances, one of these basic programs will serve your needs well. One limitation of these programs, however, is that you can enter only two categories of transactions—income and expense. So although you *can* use Quicken and CheckWriter II to, say, track stocks and investments, you have to do some extra work—for instance, entering adjustment transactions. ■ Another check-writing-only program is Provue's Personal Finance, a template that works with ProVue's Panorama database. Similar in function to Quicken or CheckWriter II, the program costs only $25, which makes it an attractive purchase if you already own Panorama. If not, you're better off going with Quicken or CheckWriter II, which offer more power. ■ A slightly different type of check-writing program, CheckFree from Checkfree Corporation, combines electronic check writing with a check-mailing service. You subscribe to CheckFree for $9 per month; you then write checks and have them delivered via modem, rather than mailing them yourself. As with standard check-writing programs, you can charge checks to expense categories and deposits to income categories. CheckFree enables you to keep your account balance current (what you send is what you're paying out of your account) and makes reconciling

your account simple and direct. The program also allows for budgeting, and it exports data to Excel and to word processing programs.

Several programs give you access to financial information. You can download current financial data on thousands of public companies, get price quotes on stocks, and even buy and sell securities through various brokerage houses.

Knowing Your Net Worth

If you want a more-detailed level of money management, check out Survivor Software's MacMoney and The Software Toolworks' Dollars & Sense. These programs offer income and expense categories as the check-writing programs do, and they also enable you to track liabilities and assets. If you take the time to enter all the data called for, you can produce a balance-sheet report that tells you exactly what all your assets, like your house and car, are worth, as well as create a detailed list of your liabilities—like how much you owe on various credit cards. The programs then total your assets and liabilities and tell you exactly what your net worth is.

MacMoney and Dollars & Sense can also perform basic calculations. For instance, MacMoney can calculate how much the payments will be on any potential loan. You simply enter the amount you want to borrow, the interest rate, and how long it will take to repay the loan, and voilà—MacMoney tells you exactly how much you'll have to pay each month. You can also track stocks and investments in these programs. But as with the check-writing programs, the more financial information you want to track, the more difficult your record-keeping chores become.

Users with a temperament that can withstand lots of detail work should check out Andrew Tobias' Managing Your Money from MECA Software. This extensive program enables you to do everything that you can in MacMoney or Dollars & Sense, plus you'll get specific screens for handling investments and taxes. The program is updated at least once a year to accommodate tax law changes, but even so, you won't get the level of detail that dedicated tax-preparation programs such as SoftView's MacInTax provide.

Managing Your Money provides separate screens for stocks, bonds, and other investments. If you enter all your data and keep the figures current, you'll not only be able to see what your investments are worth, but you'll also have excellent records on the age of these investments and how much you've made (or lost). You'll also have a complete data file that details all the items in your financial portfolio. Managing Your Money also enables you to do such things as calculate loan payments, project the future value of investments or savings accounts, figure out how much insurance you'll need, and get approximate projections on what you'll owe in income taxes.

CYNTHIA MOORE

Balancing Act Television writer-producer Linwood Boomer has finances too complex to track manually. Boomer uses Survivor Software's MacMoney to track a variety of checking accounts—personal, business, and joint. "With MacMoney, I can balance all six of my checking accounts to the penny," says Boomer.

CHECK-WRITING PROGRAMS

Program Company	Andrew Tobias' Managing Your Money MECA Software	CheckFree Checkfree Corporation	CheckWriter II Aatrix Software	Dollars & Sense Software Toolworks	MacMoney Survivor Publishing	Personal Finance[1] ProVue Development Corporation	Quicken Intuit
Price	$219.98	$29.95[2]	$59	$99.95	$119.95	$25	$59.95
Budgeting	●	●	●	●	●	○	●
Electronic check transmission	○	●	○	○	○	○	○
Asset and liability categories	●	○	●	●	●	●	○
Loan and savings calculations	●	○	○	○	●	○	○
Insurance-needs calculations	●	○	○	○	○	○	○
Retirement planning	●	○	○	○	●	○	○
Dedicated investment tracking	●	○	○	○	○	○	○
Transfers between checking & savings accounts	●	○	●	●	●	○	○
Tax estimator	●	○	○	○	○	○	○
Mortgage-refinancing calculations	●	○	○	○	○	○	○
Exports to MacInTax	●	●	○	●	●	○	●
Free, unlimited telephone support	○	●	●	○	●	○	●

The disadvantage to using Managing Your Money is that you have to adopt data entry and updating as a personal religion, or the information you get from the program won't be worth the phosphor coating on which it appears. This consistent data entry takes a lot of self-discipline. If you're not prepared to dedicate yourself to the work required to initiate and update these programs, you'll feel much more comfortable (and less guilty) with a more limited program such as Quicken or MacMoney.

Investing Wisely

Some of the most popular personal finance programs are those that help you manage investments (such as stocks or bonds). To use most of these effectively, you need to own a modem and be willing to pay the fees for downloading information from financial databases such as Dow Jones News/Retrieval. You'll also need to spend time setting up the programs correctly and then ensuring that the data is kept up-to-date.

Most investment programs let you enter assets manually or download information from an online database. Then you establish financial goals and evaluate potential investments using graphs or text reports to compare those investments to various standards (such as inflation, the price of gold, or the Standard and Poor's 500). The programs then track your progress.

Several programs such as Pro Plus Software's Wall Street Investor, The Right Time from T.B.S.P., Market Manager Plus from Dow Jones, Wall Street Watcher and Stock Watcher from Micro Trading Software, and The Investor from Arminius Publications give you access to financial information contained in the Dow Jones News/Retrieval database. You can download current financial data on thousands of public companies, get price quotes on stocks, and even buy and sell securities through various brokerage houses. Some of the programs, such as Wall Street Watcher and The Right Time, automatically update the value of your investments once your Mac has connected to the database.

If these programs are too hard-hitting, other companies offer products for tracking only certain types of investments. Larry Rosen Company offers programs for tracking and analyzing stocks, bonds, and real estate; calculating the cost and yield of loans; and analyzing whether or not you should refinance a mortgage loan.

Another niche product, GenMicronics' Financial Decisions includes 115 Excel templates that enable you to set goals (for example, retiring or making a large purchase) and then project what your investments will yield toward meeting those goals. Suppose, for instance, you want to buy a house in five years. Using Financial Decisions, you can learn how much you have to invest, say monthly, and for how long, and at what rate of dividends or interest to reach your goal.

Microsoft Press publishes Money Manager, a book and a disk with 31 Excel templates that cover the gamut of investment options. For instance, there are templates that help you analyze whether it's financially smarter to buy a house or rent, or to secure a fixed- or variable-rate loan. Other templates help with tax planning, saving strategies, debt management, and real estate investments. The book has excellent explanations and even goes into such basics as balancing a checkbook. Money Manager offers you, for $34.95, many of the features that Managing Your Money does—minus integrated check writing, financial reporting functions, and Andrew Tobias' humorous commentaries.

While you can perform many analyses within Excel, if you're so inclined, the advantage of templates lies in paying someone else a small fee to create the correct formulas and program the macros for you. Overall, templates are an excellent buy.

As for the higher-end programs, Stock Watcher is the best value, since it offers a num-

HEIZER SOFTWARE

Heizer Software offers over 75 programs for managing personal finances. The programs are inexpensive and designed to perform specific functions. Here's a sampling of products.

General Finance Programs	Price
Check Book	$15
Loan Payoff Analysis	$6
Net Worth Calculator	$10
Personal Budget	$15
Personal Financial Planning Set	$96
Tax/Cash Flow	$36
Insurance Analysis	$16
Education Financing Analysis	$14
Estate Analysis	$16
Asset Management/Financial Independence	$34
Retirement Plan Feasibility	$10
Investment Programs	
Bond Portfolio	$25
Break-even Analysis	$8
Mutual Fund Evaluator	$15
Mutual Fund Reinvestment	$15
S & P Indexes (monthly and daily)	$12–$99
Stock Portfolio	$15
Time-Weighted IRR	$12
Variable Compounding of Investment/Loan	$10
Real-Estate Programs	
All-Purpose Mortgage Calculator	$20
Added Payment Mortgage	$15
Rent versus Buy	$9
Bi-weekly Mortgage	$25
Tax Programs	
1040 Individual	$39
Individual States (AL, CA, IL, MA, MI, MN, MS, NY)	$19
Tax Planner (1991–1994)	$20

INVESTMENT-TRACKING PROGRAMS

Program Company	Financial Decisions[1] GenMicronics	The Investor P3 Software	Larry Rosen Programs Larry Rosen Company	Market Manager Plus Dow Jones	Money Manager[1] Microsoft Press	OnTrack[1] Palo Alto Software
Price	$65	$99	$89[2]	$299	$34.95	$99.95
Update prices from company/via modem	○/○	○/●	○/○	○/●	○/○	○/○
Automatic price update/chart update	○/○	○/○	○/○	●/○	○/○	○/○
Portfolio management and tracking	○	●	●	●	●	○
Long-term planning and tracking	●	○	○	○	●	●
Checkbook management	○	○	○	○	●	●
Buying versus renting calculations	○	○	○	○	●	○
Online trading with broker	○	○	○	○	○	○
Tracks stocks and dividends on calendar	○	○	○	●	○	○
Odd lot transactions, put and call ratios	○	○	○	○	○	○

● = yes; ○ = no. [1]Template program that requires Excel to run. [2]Price is for each program offered: Bond Analyzer, Interest Calculator, Investment Analyzer, Bond Portfolio Manager, Mortgage Loan Analyzer. [3]The Right Time consists of six programs each priced at $599: Stock, Index, Futures, Mutual Funds, Stock Program/Long Term, Index Program/Long Term.

ber of features found in its $495 companion program Wall Street Watcher at less than half the price. If you want automatic charting functions and need to track puts and calls, for example, then Wall Street Watcher would be worth the extra cost. If you're not tracking a huge portfolio, I recommend The Investor as a best buy.

Taming Your Taxes

Between January and April each year, tax-preparation programs suddenly become the most popular personal finance aid. I have used various tax-preparation programs to prepare my taxes for the past seven years, and frankly, I couldn't function without one. Income-tax time used to be the time of year I most dreaded, but since I took a basic tax-preparation course (to give me more confidence) and started using a personal computer to prepare my forms, tax time has been reduced to nothing more than an annual traumatic experience.

I have used various tax-preparation programs to prepare my taxes for the past seven years, and frankly, I couldn't function without one

For the past few years, the most popular comprehensive tax-preparation program has been MacInTax. It offers a wide range of forms imports data from personal finance programs such as Quicken and MacMoney. MacInTax offers many helpful features, such as linking the forms, so that an entry on one form carries over to the other forms that require this data. The program also provides extensive help and explanations, such as helping you select the forms you'll need for your return. If you buy MacInTax before all of the current year's tax forms are completed by the IRS, and send in your registration card, SoftView will send you upgraded forms in plenty of time to do your taxes.

I am happy to report that Chipsoft's TurboTax (a popular IBM PC program) is finally scheduled to become available on the Mac for 1990 tax year returns. I used TurboTax for several years, and was one of many users begging Chipsoft to get out of the MS-DOS gutter and join the Mac crowd. The Mac beta version of TurboTax that I looked at was similiar in features and use to MacInTax. Both programs are direct and intuitive—that is especially important since you only use these programs once a year.TurboTax, in what to me seems a cruel attempt to inject fun into taxes, includes a Tax Trivia Quiz game—the equivalent of placing a method-of-execution quiz game in death-row prison cells.

If you've been using MacInTax there's no reason to switch—you're better off with a program you're already comfortable with. On the other hand, if you've been using TurboTax on the PC, you may want to switch to the Mac version when it's available. People purchasing their first tax-preparation program have a tougher choice, although MacInTax has an advantage with its proven track record on the Mac.

These programs' weakness lies in the lack of supplemental state forms. SoftView offers only 14 state programs for 1990 taxes, while Chipsoft plans to publish 10. The state supplements are sold separately, at just over half the price of the federal program. But for those users whose states are supported, these programs eliminate an extra tax-preparation chore.

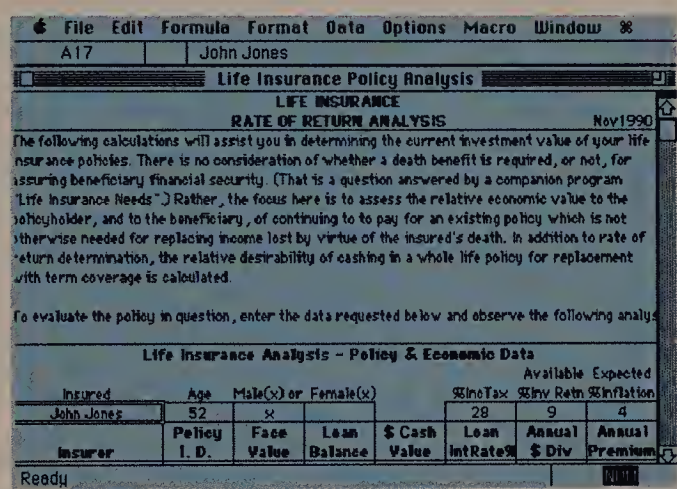
SoftView is also expanding its product line to include other tax-time helpers. For instance, if:X Personal Tax Analyst lets you perform "what-if" analyses to see how various strategies will affect your tax liability for the year and beyond. Another program, if:X Business Expense Reports, enables you to complete your expense reports and compile your business deduction forms simultaneously, thus eliminating the middle step of aggregating your expenses for your tax forms (while also making sure your deduction ducks are all lined up in an auditable row).

Several other programs are available to assist in preparing your taxes. HyperTax Tutor from

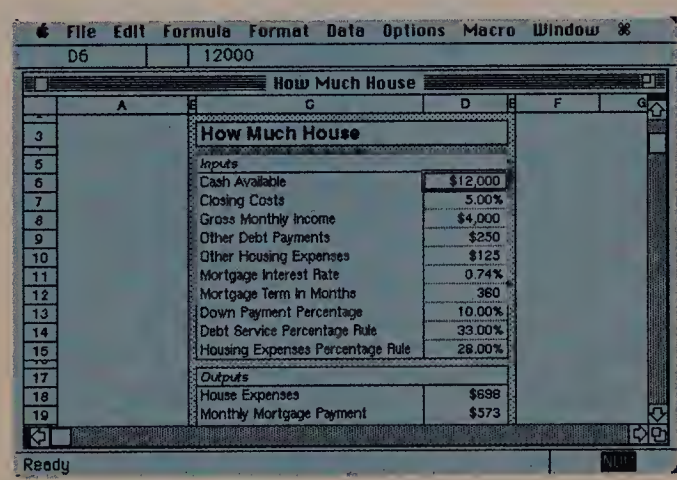
The Right Time T.B.S.P.	Stock Watcher Micro Trading Software	Wall Street Investor Pro Plus Software	Wall Street Watcher Micro Trading Software	WealthBuilder Reality Technologies
$599[3]	$195	$695	$495	$249.99
○/●	○/●	○/●	○/●	●[4]/○
●/●	●/○	○/○	●/●	○/○
○	●	●	●	●
●	○	○	○	●
○	○	○	○	○
○	○	○	○	○
○	○	●	○	○
○	○	○	○	○
●	○	○	○[5]	○

[4]Quarterly updates are provided by the company for $99.95 to $174.95. [5]Automatically downloads information, updates it, and charts it.

SoftStream International lets you select a tax area (such as charitable contributions) and then shows you the applicable tax laws and gives you tax-saving explanations and advice. Island Computer Services provides TaxSmith, a group of four Excel templates for different levels of needs. For $9.95, you can get a basic program that prepares a Form 1040 and Schedules A and B. As you move up in levels and price, you get more and more forms, until you reach the $74.95 TaxSmith Pro, a program that offers expanded forms for more-complex family taxes along with forms for small businesses, rental property, employee business expenses, and alternative minimum tax. With any tax-preparation program, be sure to check that the forms you need are included.



The Heizer Collection Heizer Software's catalog lists a host of nonintegrated personal finance programs at shareware prices. This particular program enables you to analyze a life-insurance policy to find out what the return on your investment would be.



How Much House for the Money? Money Manager from Microsoft Press includes 31 ready-to-use Excel templates. This one calculates what you can afford to spend on a new home.

The Heizer Catalog

The Heizer software catalog has such an extensive array of personal finance templates for Excel and Works that it ranks a category unto itself. Heizer publishes specialized personal finance programs written by various authors—at shareware prices. Heizer offers a wide range of other programs that run under HyperCard and SuperCard. There's even a $15 program on mixing drinks, which could be used as a tax-preparation supplement if you're so inclined.

On a more serious side, Heizer's personal finance programs include a check-writing program, a budgeting program, a daily income and expense log, a spreadsheet for recording and analyzing gas and electric bills, a program to analyze the advantages of insulating your house, a loan calculator, an analyzer for life-insurance policies, an analyzer for disability-insurance needs, and a program to record an inventory of items in your home (for insurance purposes), all priced from $12 to $20 each. Heizer also offers a personal finance–planning set, including tax planning, insurance needs, education financing, estate analysis, and asset management. This set of programs, priced from $14 to $36 separately, will set you back a total of only $96.

Don't be misled by the low price of the Heizer programs. They're all first-rate. While the programs generally don't work together like one comprehensive financial program, each delivers what its author promises, and is a solid bargain.

TAX-PREPARATION PROGRAMS

Program / Company	HyperTax Tutor SoftStream International	MacInTax SoftView	TaxSmith[1] Island Computer Services	TurboTax Chipsoft
Price for federal package	$99	$99	$9.95 to $74.95[2]	$89
Price for state supplement	NA	$69	NA	$49
Discounted annual update available	○	●	●	●
Screens are replicas of IRS forms	●	●	●	●
Forms linked for cross-entering data	○	●	●	●
Includes help screens with IRS instructions	●	●	○	●
Automatically transfers data from worksheets	○	●	○	●
Prints IRS-approved forms on blank paper	○	●	●	●
Audit flags and IRS norms	○	○	○	●
Forms guide to select needed forms	○	●	○	●
Allows "what-if" tax planning	○	●	●	●
Calculates depreciation and amortization	○	○	○	●
Provides detailed itemization windows	○	●	○	●
Checks for errors	○	●	○	●
Offers tax-savings suggestions	●	●	○	●

● = yes; ○ = no. [1]*Program is a template that requires Excel to run.* [2]*Price is based on the set of forms you purchase.*

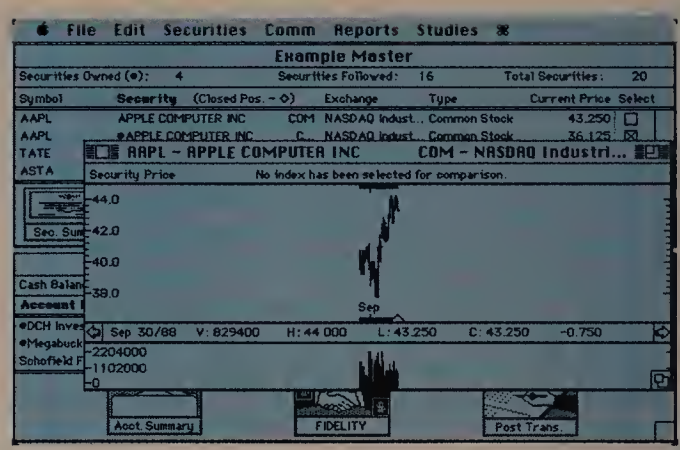
Putting Your Estate in Order

When you have made a fortune by tracking all of your investments, minimizing your taxes, and generally managing your personal finances well, you are ready for the last personal finance program you will ever need—WillMaker 4.0 from Nolo Press—which makes estate planning easy, if not fun. With WillMaker, you can leave property to your family, friends, and favorite charities by making up to 28 separate bequests; name alternate beneficiaries if your first choices don't survive you; name a guardian to care for your children; and in case you're visited by three spirits some Christmas night, you can even cancel debts others owe you. Nolo Press created WillMaker with help from a lawyer, so resulting wills are perfectly legitimate.

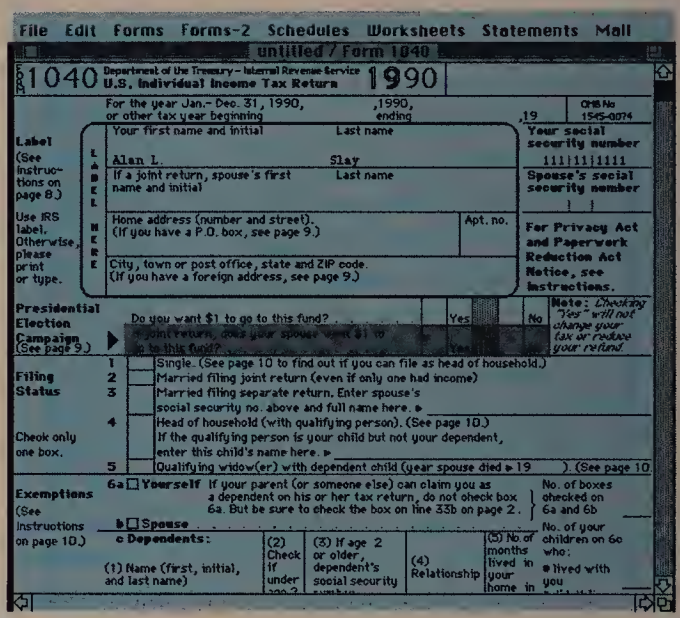
Nolo Press also publishes a companion program, For the Record, that enables you to list your assets and liabilities and calculate your net worth, to facilitate the processing of your estate and also for insurance purposes. In addition, For the Record offers various screens where you can enter all sorts of details on personal valuables such as your car, collectibles, credit cards, and even your pets. After recently having my wallet stolen, I was glad that I had filled in the requested information—having all the relevant information neatly recorded in a database rather than scattered throughout paper files made it much easier to replace my missing valuables.

Picking the Programs You Need

From start to finish (literally), there are a lot of programs that can help you manage your personal finances. If you just want to write a few checks and track overall income and expenses, Quicken or CheckWriter II will serve you well. If you want a more detailed tracking system, look at MacMoney and Dollars & Sense, and if you want to broaden into investments and insurance or tax planning, you should consider Managing Your Money.



Tracking Investments Wall Street Investor offers text and graphs that help you record and track your investments. Investment programs like this one also track stocks and bonds that you are considering purchasing.



Does This Look Familiar? MacInTax provides all the forms you need to do your taxes. You enter data into the forms, such as this 1040 form. MacInTax adds the figures and places the totals in the correct lines, bypassing lines that are inapplicable to your return.

If Managing Your Money is not sophisticated enough for your investment needs, look at the niche programs if you only need one or two functions or, if you need to manage a variety of investments, at one of the more sophisticated general programs. Investment programs cover a wide price range—from a Heizer program costing under $20 to a comprehensive program selling in the $500-to-$700 class. I consider Stock Watcher an especially good buy for a high-end program.

A good tax program is indispensable. MacInTax has built a solid reputation as a comprehensive tax program, and TurboTax looks promising. At the very least, you should consider the more limited TaxSmith program, which provides the forms that anyone with simple tax-preparation needs will need. ■

See *Where to Buy* for contact information.

***Alan L. Slay** is a free-lance writer based in Saint Louis. He specializes in financial and accounting software.*

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Circle 356 on reader service card

REVIEWS

Professional 24-Bit Animation System

FILMMAKER

Pros: Good concept; compact animation-definition files; easily generates superb 24-bit animation; antialiasing, antiflickering, and single-frame recorder controller support. **Cons:** Poor manual; weak phone support; interface hard to grasp; animations very slow to compile. **Company:** Paracomp. **Requires:** Mac II; 5MB of RAM; System 6.0.5; 32-bit QuickDraw. **List price:** $695.

JIM ROSSI, PARACOMP

Apple may herald the Mac as a multimedia machine, but no personal computer has the memory, storage capacity, or speed to create full-color animations in real time. Look at it this way: just one full-screen, 24-bit color image can consume over a megabtye of space on a hard drive. You need at least 24 of these images per second to create convincing motion; so even a 30-second animated commercial would require at least 720MB of space. Clearly, it would take more than a Mac to process that much data in real time.

You have several compromises. You can animate in black-and-white, with a program like Studio/1. You can keep the number of color objects in your animations to a minimum, with a program like MacroMind Director. And now Paracomp's FilmMaker offers a different kind of compromise.

Separation of Powers

In essence, FilmMaker separates the actual animation work (defining the motion of various objects) from the display work (showing color graphics on the screen). You program an animation in a black-and-white wire-frame mode, where each element is represented by a straight-line skeleton (see "Framed"). For the Mac, it's hundreds of times easier to move these wire frames in real time than to manipulate slow-to-draw color objects.

In this way, FilmMaker is akin to Adobe Illustrator, where you must use the Preview command to temporarily view your work with its colors and layering intact. FilmMaker has two similar commands: Show Picture, which (after a few moments) shows you a full-color still image of the current frame, and Run Sequence, which plays the actual animation, but using the wire-frame skeletons.

To program the movement of on-screen objects (which you create as color PICT files in your own paint or draw programs), FilmMaker provides three terrific tools. There's one for movement, one for rotation, and one for resizing. You establish an object's position, angle, and size on frames 1 and 50, for example; FilmMaker instantly *tweens* the object, interpolating its status on each of the intervening 48 frames automatically. By making an object grow as it moves, you create a convincing illusion that it's coming toward you; by tipping it slightly as it changes course, you give it inertia and gravity; by placing one completed sequence into another, you create complex movements-within-movements. All of the spinning and resizing is done to the original object, too; the program doesn't generate a series of jaggy, memory-eating duplicates, as Director does. And because the Mac isn't computing real-time color graphics, FilmMaker's animation-programming mode is quick, smooth, and solid.

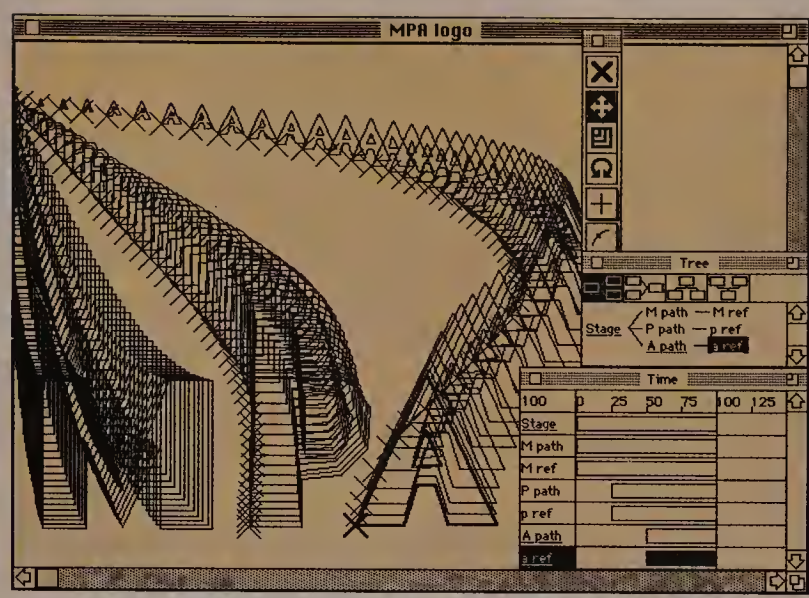
Developing Negatives

You do pay a price for this convenience and speed, however. First, the whole concept of working with representations (instead of the actual images) takes some getting used to. At a glance, you can't tell which of two overlapping objects is in front. Programming movement simultaneous with rotation or size-changing presents an even greater intellectual hurdle: for most effects, you must first create an invisible master object, which does the moving; to it you then attach the spinning and/or growing

object with its own independent motion. You're probably in for a couple days of head pounding before you understand FilmMaker's interface and its concepts. Furthermore, you do this programming mainly by entering numbers into dialog boxes—the numeric keypad gets an incredible workout with FilmMaker.

Then, sooner or later, FilmMaker must marry your animation programming (saved in one very small file) with the actual color PICT images those wire frames represent (in their own files on your hard drive). In the process, FilmMaker offers two of its most spectacular options: *anti-aliasing,* which blends colors smoothly at the edges of objects to eliminate jaggies, and a special antiflickering feature that softens any 1-pixel horizontal lines, to eliminate the annoying flicker typical of Mac-to-NTSC (video) transfers.

Here, however, is the second price you pay for being able to work in lickety-split wire-frame mode: FilmMaker takes forever to compile the animation programming into a finished sequence. If you're using the antialiasing and antiflickering options, it can take from 1 to 15 minutes to compile each frame; a complex 30-second commercial could take a day or two. And as you'd expect, the finished animation files are often huge.



Framed All Frames mode lets you see the position of every object on every frame. Here, the letters *M, P,* and *A* careen into position one at a time. The tool palette (top); the Tree window, showing relationships between objects; and the Time window, showing the *lifespans* of objects during the animation.

In the Can

The results are worth it. The compiled animations—even your first attempts—are smooth, stunning, and extremely professional-looking. Once you understand how FilmMaker thinks, you could define the animation for a spectacular animated logo, exploding diagram, or growing bar chart in a half-hour apiece (not counting compilation time). One of FilmMaker's raft of separate utility programs lets you add digitized sounds to specific frames. Another lets you animate the colors of an object, so that it shimmers, darkens, or changes hue over time. Yet another—a desktop-presentation module—lets you play a series of FilmMaker files in a sequence that includes still PICT graphics (such as bulleted text charts). At each film-to-PICT or film-to-film juncture, you can tell this miniprogram to wait for a few seconds to pass, for a mouse click, or for a user-defined keystroke before proceeding.

Incidentally, FilmMaker is now marketed by Paracomp, its third parent since it was born in France as an in-house production tool. As a result, the manual is a mishmash hybrid. French words creep in; frequent references are made to versions and features that no longer exist; numerous features are described or pictured incorrectly. And that's not to say that it would be a good manual even if those problems were corrected; it's woefully insufficient, venturing a few awkward words about each feature without even hinting at its purpose. To make matters worse, Paracomp's technical personnel are still learning the newly acquired program themselves; at this writing, although they were friendly and apologetic, they couldn't answer some questions, and answered others incorrectly.

Lights, Camera

FilmMaker isn't as effective a multimedia/presentation program as MacroMind Director, which has extensive XCMD support for controlling videodiscs and MIDI (and a far more accessible interface). But for pure, effect-intensive animation, particularly for transfer to video, FilmMaker shines. FilmMaker also talks directly to the DiaQuest NuBus board, which controls single-frame recording decks. In such a configuration, FilmMaker can compile and record one frame at a time directly to tape; in other words, you never have to generate a multimegabyte, compiled-animation file on your hard drive.

Make no mistake: mastering FilmMaker is no picnic, particularly if the manual is all you have to go on. But for the professional or corporate animator, FilmMaker is an important prospect. It separates the work that's easy for the Mac (making calculations) from work that's hard for it (drawing multicolored images in real time). In so doing, it affords great flexibility, makes better use of the animator's time, and provides some welcome new creative options.—**David Pogue**

See Where to Buy or circle 629 on reader service card.

High-Resolution Laser Printer

LASERMAX 1000

Pros: High resolution; fast on dedicated Mac II; 135 Type 1 fonts included; background processing doesn't interfere with foreground operations. **Cons:** PostScript interpreter not completely compatible; can't cancel print jobs; quality of gray tints and small type is limited by size of toner particles. **Company:** LaserMax Corporation. **Requires:** Mac II; LaserWriter driver 6.0. **List price:** $7995.

The LaserMax 1000 looks like a normal laser printer based on the Canon SX engine (the same one used in the LaserWriter IINT). It is billed as a "personal typesetter," however, and with its 1000-dpi resolution (400 by 100 for bitmapped graphics), it goes a long way toward earning that moniker. But because the LaserMax uses toner instead of photographic paper, you don't get the qual-

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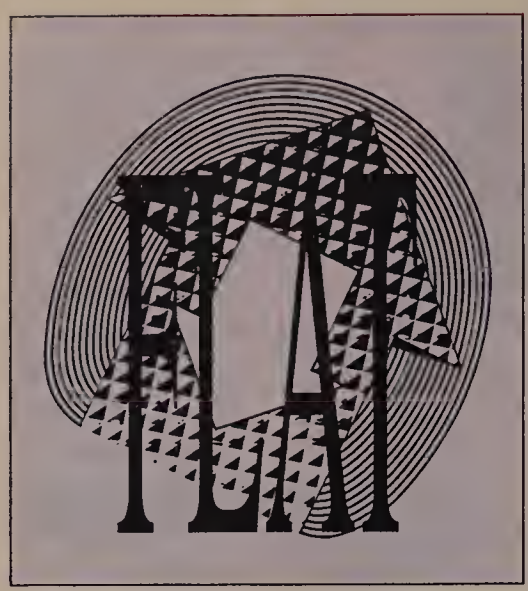

This Is Only a Test This image from Aldus FreeHand shows some of the LaserMax's PostScript problems. The type, which was squeezed both horizontally and vertically on screen, comes out squeezed only horizontally. The triangle-patterned halftone screen comes out with semirandom noise.

ity you get from high-resolution imagesetters, especially when you print gray tints and small sizes of serif typefaces.

The LaserMax is based on a PostScript-compatible interpreter that works with a NuBus board that plugs in to a Mac II, connected to the laser engine via a high-speed interface. Install the board (the manual has good, step-by-step instructions), install the software (which includes 135 Type 1 PostScript fonts), and you're ready to print. You select the Apple LaserWriter driver in the Chooser, and select the LaserMax 1000 (you can change the name from the Control Panel).

The Mac II, the LaserMax board, and the LaserMax software combine to turn the Mac II into what is effectively a printer on the AppleTalk network. Any other Mac on the network can select the LaserMax from the Chooser and print to it, as with any other PostScript printer.

Background Processing

When you print to the LaserMax, it works differently from other PostScript printers. When the Mac II with the LaserMax board (the resident Mac) is running MultiFinder, the print job is spooled to disk (as a PostScript file in the Spool folder in the System Folder), and the LaserMax Print Monitor (LMPM) application takes over automatically, interpreting the PostScript and processing the job in the background. When the resident Mac is running with the Finder, you print the job to disk, and then you start the LMPM to process the job. Because printing under the Finder is a two-step operation, it is more efficient to run MultiFinder on the resident Mac. You can do other work on the resident Mac while LMPM prints in the background, though dedicating a Mac to the job speeds up printing immensely.

The LMPM is not nearly as intrusive on foreground operations as Apple's Print Monitor is (the application that runs when you enable Background Printing in the Chooser). You hardly notice the LMPM running, except when a page is actually coming out of the printer; then everything on the resident Mac stops for about ten seconds. Because the LMPM works so hard to be unobtrusive, it slows down immensely if you are doing any work in the foreground; the LMPM lets you work, but in the process doesn't do much work itself.

PostScript Compatible

The LaserMax uses a non-Adobe PostScript interpreter, or PostScript clone. Like other PostScript clones', the LaserMax's interpreter doesn't print everything perfectly, notably fancy PostScript patterns and halftone fills, as well as relatively simple things like distorted type (see "This Is Only a Test"). Sometimes it fails to print at all. The same is true with Adobe interpreters, of course, but the LaserMax failed to print some jobs that printed fine on an Apple LaserWriter IINT.

Since the PostScript processing happens in the background, you do not get the same kind of feedback you get from a regular PostScript printer over AppleTalk. About the only messages are "busy" and "processing job." You also cannot download fonts in advance, so every time you print, the Macintosh has to download the fonts, as well as reinitialize the board with Laser Prep (or Aldus Prep for PageMaker).

When the LaserMax fails to print a job, it doesn't do a very good job of cleaning up after itself; the file hangs around in the spool folder, which spurs the LMPM to fruitless attempts at printing the document. The Cancel Printing button also doesn't work in the version I tested. The only solution is to quit the LaserMax Print Monitor and then quickly—before the LMPM starts up again—throw away the file in the Spool folder.

36 pt ab
24 pt abcde
12 pt abcdefghijklmno
10 pt abcdefghijklmnopqrs
8 pt abcdefghijklmnopqrstuvwxy
6 pt abcdefghijklmnopqrstuvwxyzABCDEF

36 pt ab
24 pt abcde
12 pt abcdefghijklmno
10 pt abcdefghijklmnopqrs
8 pt abcdefghijklmnopqrstuvwxy
6 pt abcdefghijklmnopqrstuvwxyzABCDEF

36 pt ab
24 pt abcde
12 pt abcdefghijklmno
10 pt abcdefghijklmnopqrs
8 pt abcdefghijklmnopqrstuvwxy
6 pt abcdefghijklmnopqrstuvwxyzABCDEF

Strong, Silent Type These three samples, set in Palatino, were printed on a LaserWriter at 300 dpi (top), a LaserMax 1000 at 1000 dpi (middle), and a Linotronic 300 at 1270 dpi (bottom). The type from the LaserMax has almost no visible jaggies, but even with Palatino's sturdy serifs, the type starts to get clunky at small sizes.

The big question is how the output looks. The answer? Pretty good, as long as you avoid gray tints and small sizes of serif type (see "Strong, Silent Type"). Gray tints aren't nearly as smooth as the almost invisible halftoning you get from an imagesetter with a 100-line screen. Also, the grays on the LaserMax come out too dark—regardless of the printer's density setting. Where dark objects are on top of

(continues)

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gray tints, a halo-like effect of lighter gray is apparent around the dark objects. Serif type, especially in smaller sizes, doesn't have the fine elegance that you get from imagesetters.

If you use the LaserMax and want imagesetter quality, you have to compromise. Don't use serif type smaller than 10-point size, and avoid grays entirely. If you can work within these constraints, or if you need print quality somewhere between a 300-dpi laser printer and an imagesetter, the LaserMax is worth considering.

If you produce a wide variety of jobs, however, especially jobs containing special PostScript effects, you'll need to think seriously about spending $8000 on a printer that's based on a somewhat-less-than-reliable PostScript-clone interpreter.—**Steve Roth**

See* Where to Buy *or circle 649 on reader service card.

HyperCard and CD Audio Program

THE STRING QUARTET: THE ESSENCE OF MUSIC

Pros: Easy to install and run; good beginner tutorials and historical background; includes numerous musical examples. **Cons:** Requires 6.5MB of hard drive space; initial orientation can be difficult; sketchy manual. **Company:** Warner New Media. **Requires:** Mac Plus; hard drive; CD ROM drive; earphones or audio playback equipment. **List price:** $66.

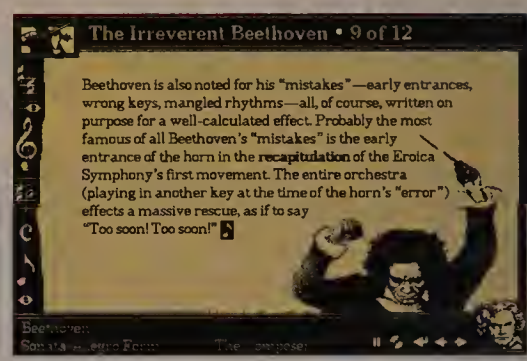
"It is the world's own dance," Richard Wagner wrote concerning the finale of Beethoven's String Quartet No. 14, Op. 131. It contains "wild pleasure, painful weeping, the ecstasy of love, supreme joy, fury, voluptuousness, and suffering," he continued, a description that would serve as well for the entire work. One of the Late Quartets, this seven-movement quartet was considered by Beethoven to be his best; it now serves as the centerpiece of Warner New Media's The String Quartet: The Essence of Music.

Following Warner's first CD ROM release, Mozart's opera The Magic Flute (see *Reviews,* October 1990), and nicely complementing the first in The Voyager Company's CD Companion Series, Ludwig van Beethoven Symphony No. 9 (see *Reviews,* June 1990), this new addition to Warner's Audio Notes line is a combination HyperCard stack, audio CD, and CD ROM disc. Installation is straightforward: you insert the CD in a CD ROM player and drag the seven HyperCard files from the CD to the hard drive. Beethoven needs almost 6.5MB as compared to 13MB for The Magic Flute and 1.7MB for the single-CD Symphony No. 9. This stack doesn't install a button on the Home card (you can, of course, install one yourself).

Warner seems to have progressed since Magic Flute, which requires, among other things, that you replace your usual Home card with a special Magic Flute Home card each time you want to play the CD; The String Quartet, however, is as easy to launch as any HyperCard stack. The 1-page information sheet, although still inadequate, is nonetheless an improvement over The Magic Flute's manual; The String Quartet's manual at least carefully enumerates all the CD ROM system files that the program requires. (It also warns that the program runs better with Adobe Type Manager turned off; a minor inconvenience.)

Warner has chosen the Vermeer Quartet's recording of the piece—a good performance (quite good to my ears), but to most critics, not one of the very best. Unfortunately, as sometimes occurs with closely miked recordings, the listener is subjected to a lot of heavy breathing as well.

As with both The Magic Flute and Symphony No. 9, The String Quartet offers the listener a variety of ways to approach the music. Four musical analyses provide running commentaries on different aspects of the quartet. The first commentary is an introduction that combines discussion of general musical concepts with nontechnical descriptions of the quartet's major elements. The second commentary explains the structure of the quartet in greater depth, while the third discusses its tonal and harmonic aspects. If I have any quarrel with these three commentaries, it is only that they too often lack the intense feeling for the music so evident in Voyager's



Navigating a Musical Masterpiece In The String Quartet, you can hear a musical example by clicking on a highlighted eighth note. Clicking on one of the topics listed at the bottom of the window sends you to a different part of the program. Clicking on a word in boldface, such as *recapitulation,* opens the glossary entry for that term; clicking on the violinist in the upper-left corner resumes the quartet and the currently selected commentary.

treatment of Symphony No. 9.

The fourth commentary is a graphical display of the four voices and—measure by measure—the subjects, themes, questions, answers, bridges, and other musical material each one is playing. Warner gives you the option of entering your own observations in a fifth commentary section, consisting of a sheaf of blank pages—each page keyed to a particular section of the quartet.

While the quartet is playing, you can click on a number in the upper-left corner of the screen to switch from one commentary to another. You can also open a special quartet map and use it to move to any part of the quartet, open CD-player controls at the bottom of the screen to skip a track, scan or stop the music, or pause to explore a related topic. If you have two CD ROM players and the Juilliard String Quartet version on a standard audio CD, you can also use the quartet map to switch back and forth between the two different performances and compare interpretations.

Three major musical side trips, each divided into numerous subtopics, are also available. One—the most complete remedial music-appreciation course yet on CD ROM—covers such basic concepts as musical notation, rhythm and meter, pitch, intervals, and harmony. Another describes musical forms, the origins of chamber music, the stringed instrument family, the musical relationships among the Late Quartets, and the

(continues)

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We do our homework, too. We spend as much as five hours a week with our vendors learning about their products for your needs. We listen to you, too. You said you absolutely, positively needed your order fast. So we made a special arrangement with Federal Express that gives you next-day delivery for only $2. You said you wanted to get the most for your money, so we keep our prices really competitive. And we don't forget you after the check clears. Our toll-free tech support and money-back guarantee keep you happy after the sale.

Give us a call! Once you try us, I know you'll agree with Dr. Barnett when he says, "I have no doubt that I'll be ordering from MacAvenue again."

Instant Information with MacsFax . . .
MacAvenue's MacsFax is the fastest way to get authoritative information on any MacAvenue product. Dial our MacsFax number — 1-800-933-9002 — and within minutes, our computer will fax you spec sheets on selected MacAvenue products . We want you to have up-to-the-minute information because we're convinced that well-informed Mac buyers choose MacAvenue.

MacAvenue's Fast Lane Leasing . . .
Our leasing program is the best way to keep the latest equipment in your workplace without tying up money in equipment purchases. Your agreement usually can be completed in one day, and we'll give you great rates that are easy on your budget. Call Today! 1-800-395-6221.

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We guarantee every hardware product and every office accessory we sell. If you have a problem with any MacAvenue product, call our product support staff at 1-800-766-6221. If we cannot resolve the problem over the phone, we'll replace the product with equivalent merchandise and pay the Federal Express shipping both ways. You can be sure MacAvenue is the most reliable resource for Macintosh products.

Free With Every Order
Dr. Macintosh's Software Prescription — a disk with 10 convenient and innovative shareware programs compiled by Bob Levitus, Dr. Macintosh

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MacAvenue™

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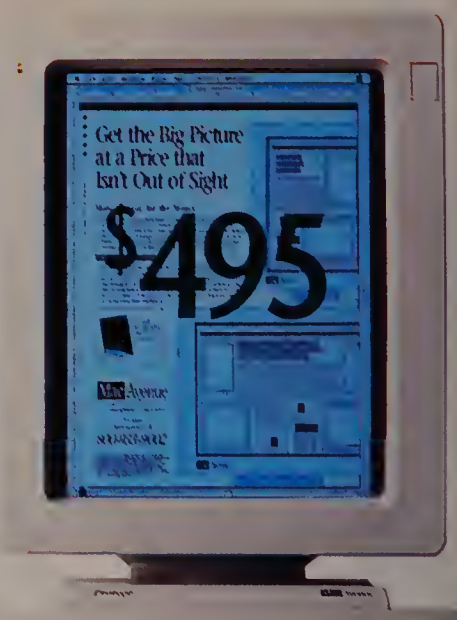
Choose MacAvenue's Protegé Line for a Great Picture or a Smooth Drive.



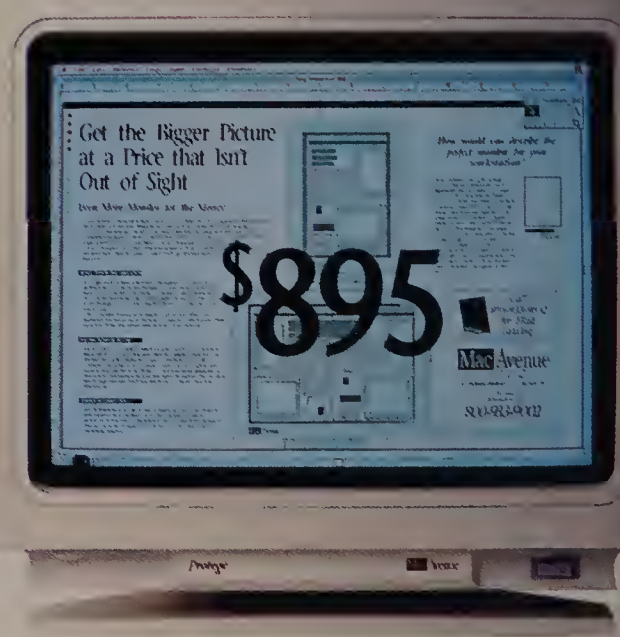
MACAVENUE ANNOUNCES THE END OF THE SCROLL BAR!

Constant scrolling takes the creative joy out of graphic design—not to mention drives you crazy. And waiting for the screen to refresh can chase off the most ardent Muse. MacAvenue rescues you from the creative doldrums with a larger and sharper image of your whole design. No scrolling.

Our Protegé monitors are value leaders in large-format Macintosh displays. Sharp screen images, flicker-free refresh rates and convenient ergonomic features such as a tilt/swivel base mean Protegé monitors are comparable to Apple and Radius products that can cost twice as much.

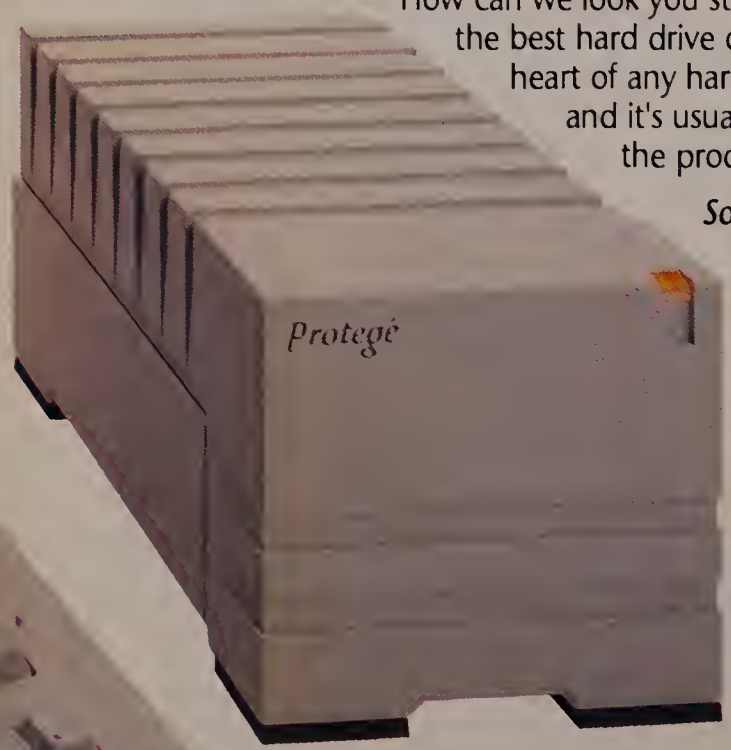
Berkeley Systems™
After Dark — *FREE!*
A $39.95 Value!

The 15-inch, ultra-high resolution screen of the Protegé Full-page Monitor displays a complete 8 1/2" x 11" page with no reduction of image size or quality. Complete with video card, it's only $495. Or get a 2-page view with the 20" Protegé Dual-page Monitor for a mere $895. Your graphics life will show definite improvement. And so will your nerves. Just to make sure you get full enjoyment from your Protegé monitor, we bundle the After Dark screen saver,—*FREE!* There's nothing like a flying toaster to perk you right up! Sure, other companies offer large monitors. But MacAvenue's prices let you actually take one home.



PROTEGÉ: THE BEST HARD DRIVE AROUND

How can we look you straight in the face and tell you we have the best hard drive on the market? Everyone knows that the heart of any hard drive system is the drive mechanism—and it's usually the same, no matter whose name is on the product.



So what makes the Protegé drive different?

It's not just another pretty case. The Protegé's metal interior and plastic exterior — just like the Mac's — allows us to control air flow and buffer the drive noise. When you work with the Protegé, all you hear is the sound of one hand clapping! Our DiskMaster™ management software lets you set up password-protected partitions that are easily accessible via the Control Panel. ProDOS, A/UX and disk spanning are also supported. But don't take *our* word for it. Ask **Robert Wiggins**, MacUser's longtime business columnist, who gives the Protegé drive his "highest recommendation." Or **Steven Bobker**, contributing editor to MacUser and Computer Shopper who says the Protegé is "far and away the best value on the market."

Exclusive!

All Protegé hard drives come pre-loaded with OnLocation, the amazing file-finding utility, and Berkeley Systems' After Dark.
A $169.90 Value

Protegé Hard Drives

Capacity	External		Internal	
	Seagate	Quantum	Seagate	Quantum
20+MB	$345	n/a	$295	n/a
40+MB	$395	$455	$325	$349
80+MB	$525	$645	$465	$549
100+MB	n/a	$695	n/a	$599
200+MB	n/a	$995	n/a	$945

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Federal Express For $2

NEW MacAvenue Software Paks!

More Fun, Less Money

The MacAvenue **Fun Pak** includes 5 programs: *Hitchhiker's Guide to the Galaxy, Leather Goddesses of Phobos, Crystal Quest, Solitaire Royale* and *Talking Moose*. A **$299 value!**

lacAvenue Fun Pak 29400 ..... **$39.95**

lake Life Better

he MacAvenue **Better Living Pak** gives ou *Dinner at Eight* (including The ncore Edition and The Weeknight ourmet), *QuickLetter, Synchronicity* and *rotector Shark*. Six packages **worth more** ian $300!

lacAvenue Better Living Pak 29402 ..... **$49.95**

Hardware

AGE DEVICES

um
3 External Protegé 24390 $455
3 External Protegé 24391 $645
1B External Protegé 24392 $695
18 External Protegé 24400 $995
3 Internal - (IIcx,ci) 24191 $349
3 Internal - (IIcx,ci) 24192 $549
1B Internal - (IIcx,ci) 24193 $599
18 Internal - (IIcx,ci) 24196 $945
3 Internal - (SE-IIx) 24188 $349
3 Internal - (SE-IIx) 24189 $549
1B Internal - (SE-IIx) 24190 $599
18 Internal - (SE-IIx) 24200 $945

lake Third-arty Printer onnections

you're looking for a way to connect a third-rty, 24-pin printer to your Macintosh, the range Micro Grappler LX is the solution. onnects to Epson, Hewlett-Packard, Toshiba id other Epson 24-pin or HP LaserJet-mpatible printers.

rappler LX (Orange Micro). 22853 ..... $129

te
B External Protegé 24380 $345
B External Protegé 24381 $395
B External Protegé 24382 $525
B Internal - (IIcx,ci) 24184 $295
B Internal - (IIcx,ci) 24185 $325
B Internal - (IIcx,ci) 24186 $465
18 Internal - (SE-IIx) 24180 $295
B Internal - (SE- IIx) 24181 $325
B Internal - (SE-IIx) 24182 $465
ed Engineering
800K Floppy Drive 24735 $205
n-Density 3.5" 1.44MB Floppy Drive 24736 $239
Comm.
naFile 1.2MB DF0200 ..... 24732 $550
naFile 360K DF0100 ..... 24738 $519
naFile 360K/1.2M8 DF0102 ..... 24733 $725
naFile 360K/1.44MB DF0104 ..... 24737 $745
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oulli 40-40 ..... 24384 $2195
1B Interface Kit 23834 $48
able 44MB 24385 $1429

Kennect Technology
360K 5.25" Drive 24740 $299
Drive 2.4 (3.5") 24730 $325
Pace
Protegé HD Carrying Case 26908 $24

PRINTERS, SCANNERS AND FAXES

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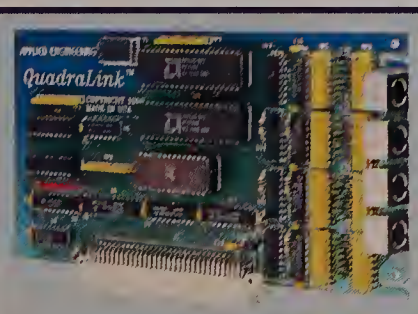
Postscript for LJ-II 38432 $299
Complete PC
Complete Page Scanner 22753 $758
Dest
Personal Scan w/ Recognize! Software 22762 $699
Dove
DoveFax-External 22701 $289
Epson
ES-300C Color Scanner w/ I/F 22765 $1824
Kodak
M150 Mac Portable 22855 $519
Logitech
ScanMan 32 ..... 22751 $319
MicroTek-IMSI
Microtek 300Z Color Scanner 22755 $1945
Orchid
OrchidFAX Modem 22702 $449
Relisys
Tefax RA2110 ..... 22700 $895
Seiko
Label Printer 22852 $195
Labels for Seiko Label Printer 26902 $11.99
Texas Instruments
35 Font microLaser w/ ATalk board 22851 $1995
17 Font microLaser w/ ATalk board 22856 $1795
1MB memory upgrade kit 38563 $259
2nd Drawer feeder w/ Ltr Tray 23058 $285
Envelope Feeder 23056 $279
Legal Paper Tray 23057 $59
microLaser Toner Cartidge 38311 $46

COMMUNICATIONS-MODEM

Applied Engineering
DataLink Express w/ MNP-5/Send Fax 22312 $239
DataLink/Mac w/ MNP-5/Send Fax options 22313 $275
Global Village
Teleport Modem 22311 $134
Hayes
Smartmodem 9600 ..... 49578 $899
MacAvenue
2400 External w/o SW 49557 $119

COMMUNICATIONS-NETWORK

Asanté
MacCon+ IIE thk/thn 22538 $395
MacCon+ IIIET thk/UTP 22529 $395
MacCon+ SE30E thk/thn 22526 $395
MacCon+ SE30ET thk/UTP 22531 $395
MacCon+ SEE thk/thn 22525 $295
MacCon+ SEET thk/UTP 22532 $295
Dayna Communications
EtherPrint 22541 $375
Farallon Computing
Liason v3.0 ..... 27744 $259
PhoneNET® Connector DB-9 ..... 22511 $31
PhoneNET Connector Din-8 ..... 22513 $31
PhoneNET Repeater 22517 $313
PhoneNET StarController® 22516 $888
Portable Pack 22519 $329
Interex
Localtalk Connector DB-9 to Din 3 ..... 22520 $32
Localtalk Connector Din-8 to Din 3 ..... 22521 $32
Phone Connector DB-9 ..... 22522 $23
Phone Connector Din-8 w/ cable 22523 $25
Nuvotech
Nuvolink II 22536 $279
Nuvolink SC 22535 $389
Shiva
NetModem V.32 9600 baud 22528 $1425
NetSerial X232 ..... 22504 $275



More Serial Ports

Expand your system's expandability. Applied Engineering's easy-to-install **QuadraLink** lets you add four additional serial ports to your Macintosh. Includes a "shadow driver" so that all the new ports will be recognized by virtually all software.

QuadraLink (Applied Eng.). 26917 ..... $205

Technology Works
Mac II Ethernet Kit 22539 $275
Mac II/10t Ethernet Kit 22540 $275
Modem (thin) 22527 $395

MONITORS AND VIDEO CARDS

MacAvenue
Full Page Monitor w/ Mac II Card 22013 $495
Full Page Monitor w/ SE Card 22011 $495
Full Page Monitor w/ SE/30 Card 22012 $495
Dual Page Monitor w/ Mac II Card 22017 $895
Dual Page Monitor w/ SE Card 22015 $895
Dual Page Monitor w/ SE/30 Card 22016 $895
Micron
Mac II 8-Bit 1024X768 ..... 23544 $585
Mac II 8-Bit 640X480 ..... 23543 $345
SE/30 8-Bit 1024X768 ..... 23542 $585
SE/30 8-Bit 640X480 ..... 23541 $345

The Easiest-to-use Modem

The TelePort Modem from Global Village is ready to send as soon as you plug it into the ADB port on your Mac. Fits anywhere, includes MNP5 error correction and automatically matches the transmission speed of your connection.

TelePort Modem (Global Village). 22311 ..... $134

RasterOps
19" monitor w/ Color Board 708 ..... 22006 $4550
Color Board 208 ..... 23538 $375
Color Board 264 ..... 23531 $575
Colorboard 264/5E30 ..... 23539 $685
ColorBoard 364 ..... 23540 $974
Grey Scale 19" monitor GS 22007 $1614
Seiko
14" Color RG8 ..... 22002 $595
20" Color Monitor w/ 8 Bit Card Mac II 22018 $2770
20" Color Monitor w/ 8 Bit Card SE/30 ..... 22019 $2770
20" Trinitron Color Monitor 22009 $2395
Seiko/RasterOps
14" w/ ColorBoard 208 ..... 22005 $909
14" w/ ColorBoard 264 ..... 22001 $1119
Sigma Designs
Colormax 19" monitor w/ card 22000 $4645
L-View Multi-Mode 19" w/ card 22008 $1495
PageView 15" w/ Mac II adapter 22100 $1050
PageView 15" w/ SE adapter 22101 $999
PageView 15" w/ SE/30 adapter 22106 $1050
SilverView 21" w/ Mac II adapter 22104 $1599
SilverView 21" w/ SE adapter 22107 $1599
SilverView 21" w/ SE/30 adapter 22103 $1599

ACCELERATOR AND EXPANSION BOARDS

DayStar
030 25MHz IIcx w/ co 68882 ..... 23640 $1499
030 33MHz IIcx w/ co 68882 ..... 23641 $1899
030 40MHz IIcx w/ co 68882 ..... 23642 $1999
030 50MHz IIcx w/ co 68882 ..... 23643 $2599
50MHz PowerCache IIci 23649 $1995
Technology Works
IIci Cache Card 23648 $269

MEMORY EXPANSION

Applied Engineering
1MB Upgrade for MacRam Portable Card 25488 $359
MacRam Portable Card w/ 1MB 25487 $499
Bay Electronics
1MB TI Laser Memory Upgrade 25489 $215
Interex
Tool kit; 3 pieces 26881 $13.49
Technology Works
2 X 1MB SIMM Kit 80ns 25480 $108
4 X 1MB SIMM Kit 80ns 25482 $216
4 X 4MB II/IIx SIMM Kit 25490 $1195
4 X 4MB IIfx SIMM Kit 25491 $1399
4 X 4MB SIMM Kit 80ns 25481 $1120
Mac Portable 1MB Upgrade Kit 25485 $289
Mac Portable 3MB Upgrade Kit 25486 $1195

NEW LOW PRICE! $49/Megabyte

Get the most processing power out of your Mac: build your four-slot SE to 4MB or your 8-slot Mac to 8MB. Only the best surface-mounted 80 nanosecond memory products. Call MacsFax for pricing chart.

2 x 1MB SIMM Kit —80ns (Technology Works). 25480 ..... $98
4 x 1MB SIMM Kit —80ns (Technology Works). 25482 ..... $196

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Customer Service Is Our Most Important Product

Create Professional Animation

FilmMaker from Paracomp gives you professional-quality animation with features such as real-time control over position, scale and rotation of animated objects, as well as full-screen anti-aliasing. And with the help of **FilmMaker**, your presentations also will take on new power.

FilmMaker (Paracomp). 29900 ..... $437

Choose the Best Monochrome

The Sigma **L-View** will zoom out to display your work as small as 70% or zoom in to show an image as large as 200%. Use the **L-View** hot-key commands to choose one of six built-in resolution options. This low-emissions monitor also offers a fast 92Hz refresh rate that gives a flicker-free screen image.

L-View Multi-Mode (Sigma)
19" monitor w/card. 22008 ..... $1495

KEYBOARDS, MICE, ETC.

Advanced Gravis
- ADB Mousestick 25286 $66

Basic Needs
- Cordless Mouse 25282 $89

DataDesk
- Mac 101 Keyboard Platnm (Plus) 25185 $134
- Mac-101 Keyboard, ADB 25180 $134
- Mac-101 Keyboard Beige (Plus) 25181 $134
- SWITCHBALL 25183 $98
- SWITCHBOARD 25182 $159

Kensington
- Turbo Mouse ADB 25281 $107
- Turbo Mouse Plus 25280 $107

MicroSpeed
- MacTrac (SE, II, IIgs) 25285 $75

Microtouch
- Mousestick 25287 $158

Mouse Systems
- Little Mouse 25283 $75
- Trackball ADB 25284 $69

Seiko
- DT3600 Digitizing Tablet 23734 $295

ACCESSORIES

American Power
- UPS II0/SE 26292 $207
- UPS 370ci 26294 $337

Applied Engineering
- QuadraLink 26917 $205

Bernouilli
- Bernouilli B33C 44MB 57804 $95

Calcomp
- WIZ 26918 $157

Cover-Up
- Mac Plus KB Skin (B1 key) 25780 $14.95
- Mac Plus KB Skin (w/ # Pad) 25781 $14.95
- Mac SE/II 101 KB Skin 25782 $14.95
- Diskette Wallet 10pk (alligator) 26909 $7.50

Cover-Up (continued)
- Diskette Wallet 10pk (blue) 26910 $7.50
- Diskette Wallet 3pk (alligator) 26911 $5.50
- Diskette Wallet 3pk (blue) 26912 $5.50
- Mac Plus/SE Dust Cover 26894 $8

Fellowes
- Compact Personal Shredder PS 50 ..... 52655 $119

Ilnland
- 3 Mode Surge Protector 40505 $14.50

InnovativeTechnology
- The Library (black) 26905 $12
- The Library (grey) 26903 $12

Interex
- 9 Pin Male to 9 Pin Male 26298 $7.95
- Keyboard Replacement Cable, 3ft 26900 $7
- Mac 128/512 to Hayes DB9 to 25pin, 6ft 26281 $7
- Mac 128/512 to Imgwrtr DB9 to 25pin 26282 $7
- Mac to SCSI 25m to 50m 2ft 26280 $11
- Mac to SCSI System cable, 6ft 26290 $15
- MacPlus Peripheral Adptr cable, 1ft 26283 $7
- MacPlus, SE, II to Apple Modem 26284 $7
- MacPlus, SE, II to Hayes Din B to 25pin 26285 $7
- MacPlus,SE,II to Imagewrtr DIN 8 to 25 ..... 26286 $7
- MacPlus,SE,II to Imgwrtr II DIN 8/DIN 8 ..... 26287 $7
- Mini DIN-8 to Mini DIN-8 Null 26297 $7.95
- SCSI Terminator, M/F Daisy-Chain 26295 $18
- SCSI Terminator, male 26296 $18

Irwin Magnetics
- External Tape Back-Up 5040/60 ..... 23832 $529
- External Tape Back-Up 5080/120 ..... 23833 $719

Kensington
- Apple RGB Anti-Glare Filter 26891 $62
- Mac II Monitor Extended Kit 26899 $32
- Mac II Monitor Stand 25580 $62
- Mac II Stand and Cable Kit 26892 $63
- Mac II System Stand 26887 $20
- Masterpiece Mac II 26893 $103
- SE Anti-Glare Filter (beige) 26882 $32
- SE Anti-Glare Filter (platinum) 26883 $32
- Security Kit 26884 $33

Centron's Computerized Casino

If you can't afford a quick trip to Las Vegas, Centron's Casino Master will give you all the thrills of gambling with no risk of losing money. Roulette, Blackjack, Poker, Baccarat, Craps— all your favorite games. Complete with betting strategies, hints, odds and more.

Casino Master. 28758 ..... $38
Casino Master Deluxe. 28760 ..... $43

Kensington (continued)
- System Saver Plus, (beige) 26888 $62
- System Saver Plus, (platinum) 26907 $62
- System Saver SE 26889 $62
- Tilt/Swivel 25582 $24
- Universal Printer Stand 26896 $16.95

MacAvenue
- 3.5" Fuji Rainbow Diskettes 1.44MB 47496 $15.95
- Keyboard drawer 41753 $19
- Teak 3.5" Double Rolltop Box (90) 41601 $29
- Teak 3.5" Single Diskette Box (45) 41600 $17.99
- Teak Keyboard Drawer 41752 $69

Pace
- MacAvenue Carrying Case 26898 $65
- MacAvenue Carrying Case Ext. Kybd. 26901 $76

Sony
- 3.5" Diskettes 1.44MB 10Pk 57440 $24.95
- Sony 3.5" Diskettes 800KB 10Pk 57401 $13.95

Sophisticated Circuits
- PowerKey 25030 $64

Tripplite
- SpikeBar SK6-6 ..... 40510 $22

SOUND INTERFACES

Articulate Systems
- Voice Navigator II 23736 $649

Farallon Computing
- Hyperdialer 26886 $32
- MacRecorder® 23730 $158

Passport Designs
- MIDI Interface 23732 $76

"Cream of the 2-D Crop" - *Infoworld*

Generic CADD from Generic Software gives you powerful computer-aided design features and sophisticated tools — all the tricks of the trade — at a price that's only a shadow of other CAD package prices.

Generic CADD. 29280 ..... $372

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WORD PROCESSING, WRITING

Ashton-Tate
- FullWrite Professional v1.5 ..... 30600 $253

Nolo Press
- WillMaker v4.0 ..... 29888 $34

WordPerfect
- WordPerfect Mac v2.0 ..... 30591 $234

PAGE LAYOUT PUBLISHING

Aldus
- PageMaker v4.0 ..... 29781 $497

Claris
- SmartForm Designer 29200 $291

UTILITIES FOR WRITERS/PUBLISHERS

DeltaPoint
- TASTE 30638 $98

Lexpertise
- MacProof v3.2.1 ..... 30630 $115

Lifetree
- Correct Grammar v2.0 ..... 30633 $49

Reference Software
- Grammatik Mac v2.0 ..... 30634 $50

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Adobe
- Adobe Plus Pack v1.0 ..... 29834 $119
- Streamline v1.2 ..... 29268 $225
- TypeAlign v1.0.4 ..... 29826 $58
- TypeManager v2.0 ..... 29825 $57

Broderbund Software
- Typestyler 30450 $115

Business Software

INTEGRATED/BUNDLED APPLICATIONS

Microsoft
- Microsoft Works v2.0 w/ Quicken v1.5 ..... 30580 $199

ACCOUNTING/BOOKKEEPING

ChipSoft
- Turbo Tax 28500 $51

DAC
- Easy Light Checkbook Accounting v2.0 ..... 28475 $41

Intuit
- Quicken v1.5 ..... 28458 $39

Meca
- Managing your Money v3.0 ..... 28463 $139

DayStar Gives You Top Speed

When you're ready for serious high-end performance —50 Mhz speed — you need DayStar Digital's PowerCache IIci. Plug in this turbo-charged cache card and your IIci will be the fastest Mac alive, faster than even the IIfx.

PowerCache IIci (DayStar). 23649 ..... $1995

Software Toolworks
- Dollars & Sense v5.0 ..... 28465 $86

ProPlus
- Wall Street Investor 28494 $395

Reality Software
- WealthBuilder 28496 $145

Softsync
- Accountant Inc. Professional 28481 $345

SoftView
- if x: Personal Tax Analyst 28498 $47
- MacInTax 1040 Federal 1990 ..... 28502 $61

Timeslips
- Timeslips v3.0 ..... 28504 $196

DATA ANALYSIS AND PRESENTATION

Odesta
- Data Desk v3.0 ..... 27818 $458

DATABASE

Acius
- 4th Dimension v2.1 ..... 27780 $489
- File Force 27820 $247

Claris
- FileMaker Pro 27789 $216

Fox Software
- FoxBase + Mac v2.1 ..... 27791 $292

Lotus
- Marketplace 29904 $525

Microsoft
- Microsoft File v2.0A 27798 $123

MySoftware
- MyAdvanced MailList 27816 $27

Power Up
- Address Book Plus v2.0 ..... 30442 $59

Preferred Pub's
- Database 27834 $67

Sensible Software
- Bookends v1.2 ..... 27830 $50

Ventura
- Ventura Publisher v3.0 ..... 29906 $582

OFFICE PRODUCTIVITY PROGRAMS

Microsoft
- Microsoft Mail v2.0 ..... 30496 $85

Power Up
- Letter Writer Plus 30440 $54

SPREADSHEET PROGRAMS/TEMPLATES

Informix
- Wingz v1.1 ..... 30184 $245

Federal Express For $2

Tax Help From MacInTax

Four-time *World Class* and *Eddy* award winner! MacInTax is the best-selling tax product for the Macintosh. Loaded with new features for 1990! And MacInTax is the only tax product available that prints exact replicas of IRS forms and schedules on blank paper. Full integration with 13 optional state supplements.

MacInTax (SoftView). 28502 ..... $61

Communications

ON THE MODEM

Farallon Computing		
Timbuktu/Remote™ v2.0	27669	$123
Hayes		
SmartCom II v3.1	27662	$84
Microcom		
Carbon Copy Mac v1.04	27708	$119
Microsoft		
MS Mail 20 Pack v2.0	27680	$959
MS Mail Workstation	27676	$83
Prodigy Services		
Prodigy Startup Kit	27726	$27
Solutions Inc.		
Faxgate Plus	27712	$237
SW Ventures		
Microphone II v3.0	27660	$213

HP Printing Utility

MacPrint lets you print from any Mac application to the Hewlett-Packard LaserJet and DeskJet series printers as well as the Epson EPL 6000. Convenient Chooser-level driver selection provides straight forward Mac printing.

MacPrint v1.2 (Insight). 30428 ..... $94

Tops		
NetPrint v. 2.0	27686	$115
Tops Network Bundle/DOS	27685	$159
Tops Network Bundle/Mac	27683	$188
Traveling SW		
LapLink Connectivity	27710	$119

ON THE NETWORK

Dataviz		
MacLink Plus	27718	$118
Farallon Computing		
Timbuktu™ v3.1	27667	$95
Insignia Solutions		
Soft PC AT w/ EGA Add-on Module	27716	$355
Soft PC v1.3	27714	$245

Education and Entertainment

ON THE LEARNING CURVE

A Lasting Impression		
ResumExpert	28016	$38
Broderbund Software		
Calculus v1.2	27964	$57
Geometry v1.2	27962	$57
Physics v1.2	27966	$57
Type! v1.0	27958	$18
Carina Software		
Voyager v1.2	28004	$87
Davidson & Associates		
Alge8laster Plus	28042	$37
Math 8laster Mystery	27970	$27
Math Blaster! v1.0	27968	$29
Goldstein & Blair		
Mac Bible, 3rd edition	28026	$22
Mac 8ible (Super)	28028	$28
Great Wave		
KidsMath v1.1	27990	$25
Individual SW		
Training for Pagemaker	28030	$38
MECC		
Exploring Microsoft Works	28032	$17
Number Munchers	28034	$29
Word Munchers	28036	$29
Sensible Software		
Sensible Grammar v1.6.2	28010	$50
Simon & Schuster		
Typing Tutor	28008	$28
Visionary Software		
Synchronicity v2.5	28040	$39

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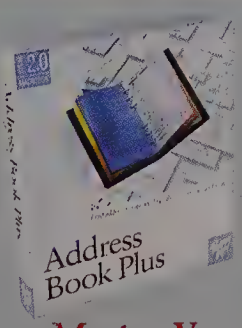

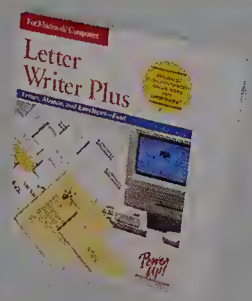

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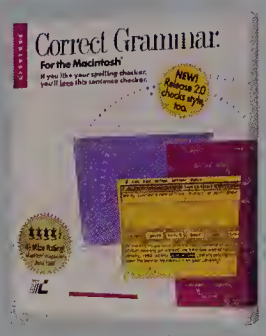

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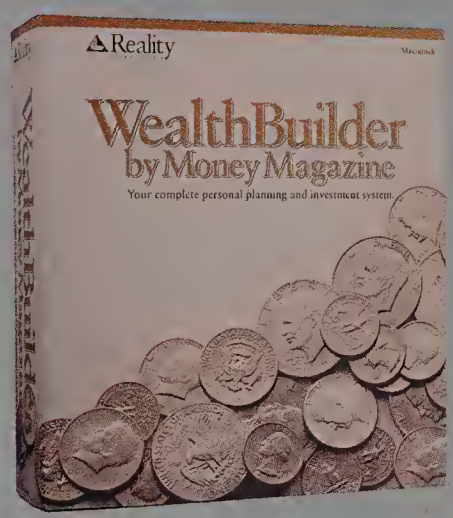

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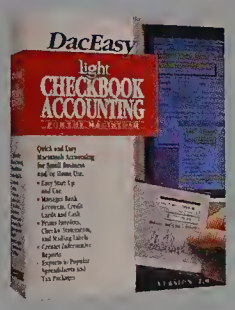

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Light Checkbook Accounting from DacEasy streamlines confusing accounting chores. Simply write your checks, make deposits or record any transaction and this program takes care of the credits and debits in the background. DacEasy Light even tracks your work to prevent costly accounting errors.

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melodies used in each movement of No. 14.

A third side trip is historical; it includes brief essays on such topics as Beethoven's deafness, his use of the metronome, and the first performances of Quartet No. 14. In addition, there is a glossary, an index, and a concise time line of Western music, all with entries that expand when you click on them. These sections are enhanced with many delightful period illustrations; indeed, elegant graphics enliven all aspects of the program.

In almost every part of the program, explanations of unfamiliar terms, related topics, the main topics menu, and the point in the quartet at which you last digressed are only a mouse click away (see "Navigating a Musical Masterpiece"). Many discussions are peppered with audio examples—from Quartet No. 14, other Beethoven quartets and symphonies, and a variety of other sources—that can be easily played and replayed. There are also nonthreatening (and nontrivial) quizzes that test you on all aspects of the program.

Although The String Quartet demonstrates the benefits of hypertext and multimedia to great advantage, like The Magic Flute, The String Quartet remains a victim of hypertext's great curse. Namely, that despite all its navigational aids, it is easy to get lost within the program, hard to know where to begin (especially if you don't know much about classical music), and almost impossible to know whether or not you've overlooked something important. A little more assistance from the manual would not be out of place.

I grew up on New York Philharmonic Young People's Concerts, conducted by Leonard Bernstein, and it seems I have yet to outgrow the joy of learning about music. Warner's Audio Notes (and Voyager's CD Companion Series) may well be an improvement on what was once, by necessity, a one-sided musical conversation. Just as chamber music itself is one of the more intellectual and challenging forms of music, The String Quartet tends to be more cerebral than either Symphony No. 9 or The Magic Flute. People raised on a strict diet of pop music may thus find The String Quartet tough going at first. No one interested in music of any kind, however, can fail to be rewarded, in enjoyment and increased musical understanding, by The String Quartet. I know I found both in large measure and eagerly look forward to Warner's next CD ROM release.

—Robert C. Eckhardt

See **Where to Buy** *or circle 724 on reader service card.*

Tape-Cartridge Backup for Networks

MACBACK 8000

Pros: Handles unattended backups; enables network administrator or workstation user to schedule a backup; maintains log of all actions for both server and client; software can be used to back up to other (nontape) devices. **Cons:** Cannot run concurrently with other AppleShare tasks; server application stops if screen saver is running. **Company:** Advanced Digital Information Corporation. **Requires:** Mac Plus; System 6.0.2. **List price:** $5295.

If you are running a network, one of your major concerns is likely to be maintaining an adequate system of backups for both the servers and the workstations on the network. Rather than depending on users to back up their Macs regularly (they don't back up regularly, do they?), it's easier to schedule a backup for them. It's even easier if you can schedule the backup from one central Mac. The MacBack 8000 offers these advantages.

The MacBack 8000 includes software for both local (attached directly to your Mac) and networked use. The MacBack 8000's hardware is a relatively large (16 by 7 by 10¼ inch) unit, which uses either DC2110 or DC2165 tape cartridges in an eight-tape magazine; its total backup capacity is either 860MB (DC2110 tapes) or 1.2GB (DC2165 tapes). The unit automatically cycles through the eight cartridges and can be locked with a key for added security. Although the unit requires only one SCSI cable to connect to the Mac, it uses two SCSI ID numbers internally, so you need to be careful when attaching other devices to the same SCSI port.

When you set up the MacBack 8000 for a networkwide backup, you designate one Mac on the network as the backup server; you attach the MacBack 8000 to it and install the MacBack Server software. All users expecting to back up files to the 8000 run the MacBack Client software. If you want to perform scheduled, unattended backups, each Mac must also have the Autostart INIT installed.

Creating a Backup Document

Every backup needs a backup document. This document is created either by the server administrator (using MacBack Server) or by a client (using MacBack Client). The backup document contains information on the files, backup frequency, backup schedule, and to which cartridge the backup should be written.

The MacBack software lets you select files for backup either specifically by name or by application. Instead of having to remember the Mac's four-character creator code for applications, the MacBack lets you use an application's actual name, which simplifies matters. You can also back up all files, or specify that only documents, or only applications, or only System files, be backed up.

The MacBack's interface for scheduling backups is easy to use (see "Let Me Check My Calendar"). You simply select the days that you want backups performed from the calendar, such as every Tuesday in a month. You can also select a given date, or you can decide to back up only on the even months of the year.

When scheduling a backup, you can use either the next available car-

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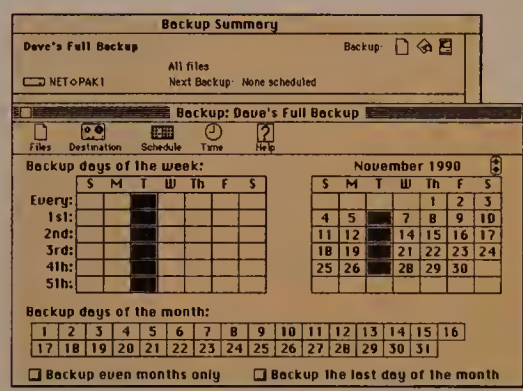

Let Me Check My Calendar Backups can be scheduled on a day-by-day basis. You can set up a backup either by selecting the day of the week (calendar on the left) or by selecting the date (right-hand calendar and lower calendar).

MARK JOHANN

The MacBack 8000 from Advanced Digital Information Corporation

tridge or one that's been previously named. The latter option is convenient if you want to keep all the files of a particular user on the same cartridge. Or, you can name cartridges according to the backup date.

Performing a Backup

Once a backup document has been created, either the server administrator or the user can perform the backup. In either case, both the MacBack Server and the MacBack Client software must be running. For scheduled backups, the Autostart INIT automatically launches the MacBack applications at a scheduled time. Each user, however, must have logged on to the backup server before Autostart can work on his or her files; this extra step enables the MacBack Server software to identify each Mac and verify that the user is authorized.

As the server administrator, you could create a series of backup documents for backing up files from your workgroup's Macs at 1 a.m. To implement the backup, you keep the MacBack Server application running on the server Mac and see that all the other Macs to be backed up are turned on, logged on to the MacBack server, and running Autostart before you leave work in the evening. Everything is automatic after that. For added security, the backup document can also contain instructions to shut down the Macs after the backups are performed.

One caution, however: I've found that screen savers interfere with the MacBack's automatic operation, both on the client and the server Macs. Pyro and After Dark prevent the MacBack from continuing with the backup if they activate to save your screen.

The MacBack offers all the control you need for networked backups. Network managers can define backup documents for customized backups. Users can also define their own backup documents for special backups or to use specially designated cartridges. In each case, the backups can be scheduled for those times least likely to affect the network and the other users. And MacBack's automation makes changing and maintaining media quite easy.

Speed Tests

Unfortunately, the MacBack is no speed demon. Using a Mac II client and Mac SE/30 server, I clocked file-transfer rates in the range of 2.2K to 8.5K per second over both LocalTalk and EtherTalk networks. (For comparison, Finder-based copies to an AppleShare hard drive over EtherTalk fell in the range of 19K to 24K per second.) Backups over EtherTalk did not offer much of a performance advantage, being about 25 percent faster than backups over LocalTalk. The main bottleneck seemed to be the tape cartridge system, since local backups (using the SCSI port) from the SE/30-to-tape system weren't any faster than the backups over EtherTalk.

If you're looking for a high-performance backup system, DAT systems or removable hard drives (like the Syquest or Bernoulli cartridges) coupled with software like Retrospect or NetStream, might be better choices than the MacBack 8000. But, if the idea of an automated multicartridge system that can run at any time of day (which might offset the speed limitations) appeals to you, the MacBack 8000 is a good choice.—**Dave Kosiur**

See Where to Buy or circle 651 on reader service card.

3-D Data Visualization

SPYGLASS DICER 1.0

Pros: Truly spectacular color inspection of data in 3-D space; only Mac product to provide these supercomputerclass functions. **Cons:** Slow; occasional mystery crashes. **Company:** Spyglass. **Requires:** Mac II; 4MB of RAM; 8-bit color; hard drive; 32-bit QuickDraw. **List price:** $495.

2-D Data Visualization and Manipulation

SPYGLASS TRANSFORM 1.0

Pros: Extends View-type tools with calculations; more powerful than View. **Cons:** Harder than View to use effectively. **Company:** Spyglass. **Requires:** Mac II; 8-bit color; hard drive. Recommended: 4MB of RAM. **List price:** $395.

Color 2-D Graphing Program

SPYGLASS VIEW 1.0

Pros: Useful image tools; nice variety of graphing modes; animation capability. **Cons:** A few graph-labeling bugs; advanced usage calls for FORTRAN proficiency and experience with HDF files. **Company:** Spyglass. **Requires:** Mac II; 8-bit color; hard drive. Recommended: 4MB of RAM. **List price:** $395.

Mac software comes from some surprising sources. For example, the National Center for Supercomputer Applications in Champaign, Illinois, developed the precursors of Spyglass's unique suite of programs—View, Transform, and Dicer. If the connection between Macs and supercomputers isn't obvious, it goes something like this: supercomputers are often used to create complex simulations in fluid dynamics, astrophysics, or other fields that generate huge volumes of data in three dimensions simultaneously. These megabytes of numerical results can typically be understood by humans only if some visualization technique translates the numbers into pictures. If you have a system (the Mac, in this

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Circle 282 on reader service card

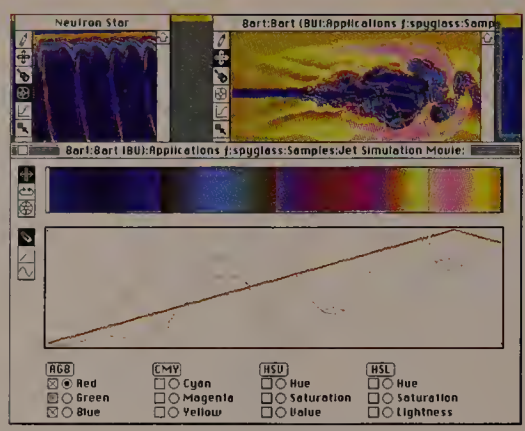
case) that can display results offline, you can use a supercomputer's precious computational time only for generating the data and use the desktop computer for the weeks or months that you might need to analyze and understand the results.

View

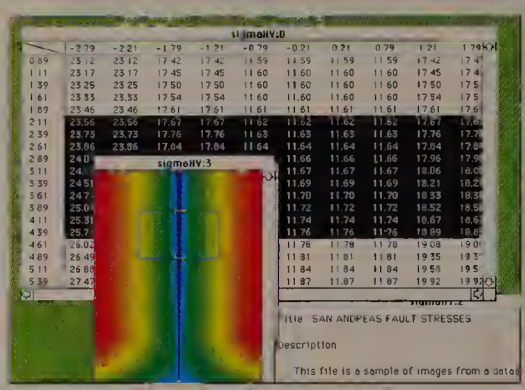
Visualizing data usually means translating tables of numbers into color raster images on a monitor screen, and this color-image generation is where these programs excel. View lets you import data tables in ASCII, Excel, or Hierarchical Data Format files (HDF might safely be said to be more familiar to mainframe FORTRAN programmers than to Macintosh users) and look at the numbers as surface, contour, dithered, or shaded plots; with a huge variety of *false-color* palettes and user-defined or default scaling schemes (the range of data values is scaled to 256 color values). Using the palettes and scaling is extremely easy; the amusingly named Fiddle tool, for example, lets you shift and compress a data-table representation just by moving the Fiddle cursor around the image. Assuming that you eventually want to view images on other monitors or print them in color, the color editor works with RGB, CMY, HSV, and HSL color models. If data warrants closer inspection, another tool lets you drag a line across the color image and view a standard *x-y* chart of the data along that linear cross section; yet another tool tabulates a histogram from pixel values in the image. View offers a particularly simple type of animation (see "Voom with a View"). If your data-generating program gives you a sequence of computed tables of the same size at regular time intervals, you can call these up automatically (rapidly from memory, more slowly from a disk) in an animation window. Controls include stop, fast forward and back, and step; for watching a computation in dynamics evolve through time it's just wonderful.

Transform

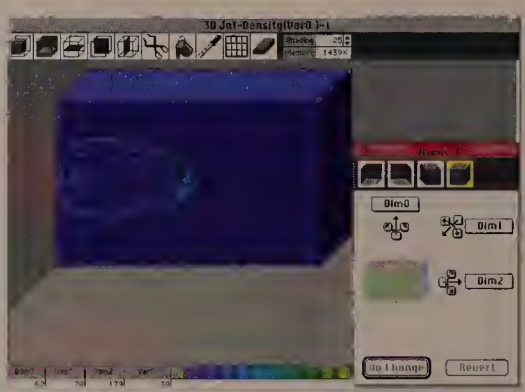
View is the tool for studying data generated by other programs; if you want to manipulate the images of the data (without recomputing at the source) you'll want Transform. Besides having



Voom with a View Besides standard false-color data coding for 2-D data sets, View lets you animate sets of images at a rate of 10 frames per second. Using the arrow buttons, the little jet shown here can be played forward and backward. At the bottom is View's facility for color-table editing.



Transform Your Vision Transform does an especially good job of making color images from data tables—you can flip back and forth between rectangular selections of raw data and the corresponding color image of the data. Transform has an easy-to-use facility for computing difference-meshes and other kinds of data manipulation.



Sliced, Diced, and Very Nice If you have a three-dimensional data set, Dicer lets you select viewing planes, cubes, and windows into different zones of the data. The dialog box at right lets you rotate your view. It's not only simple to use, it's the only Mac game in town for this kind of work.

most of the visualization capabilities of View (line graphs, histograms, color imaging), Transform has a few more tricks (rectangular-to-polar display conversion, for example), and it lets you assemble array calculations in a FORTRAN-like language using a notebook window. Different types of smoothing and interpolation are offered as standard menu items, but for fancier work—nonlinear transformations of data, arithmetic on pairs of tables, kernel convolutions (difference kernels and 5- and 9-point Laplacians are provided), or even use of external MPW C image-processing functions—you must resort to programming in a Transform notebook. Transform, however, resembles programs (Photoshop, Enhance) familiar to Mac graphics users. Transform's ability to select rectangles in the image display that are directly connected to the corresponding display of primary data might actually be the program's most useful feature (see "Transform Your Vision"). A new Spyglass product, Format, generates HDF files for use with Transform; the alternative is to use the HDF subroutines for Language Systems' FORTRAN provided with Transform as utilities.

Dicer

View and Transform provide special features, but basically represent well-executed, science-oriented versions of capabilities available in less-polished form in other programs (to be fair, you'd need a small collection of programs to replace either View or Transform). About Dicer, however, the appropriate observation is "Wow!" There's just nothing else like this program, so it's gratifying that Spyglass did such an impeccable job on it. With Dicer, you can view cross sections and combinations of cross sections of a three-dimensional data table (see "Sliced, Diced, and Very Nice"). These views can further be modified by choice of color palette and by most of the other tricks available in two dimensions with View. In principle all the data is available, and you select the viewing segment using slicing tools. Three-dimensional data sets bring their own problems: they're big, so the little memory watch in the Dicer screen is a critical bit; and they call for some formatting convention, so Dicer requires that you get your data into 8-bit 3-D HDF format using utilities provided. This last requirement might seem cumbersome, but the fact is there aren't many people who have 3-

(continues)

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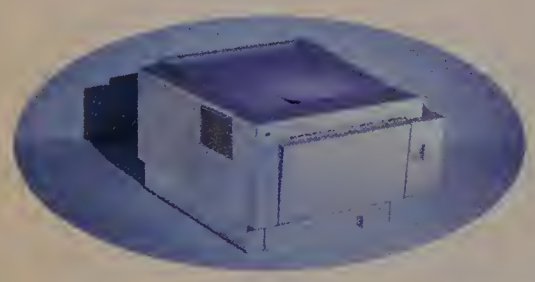
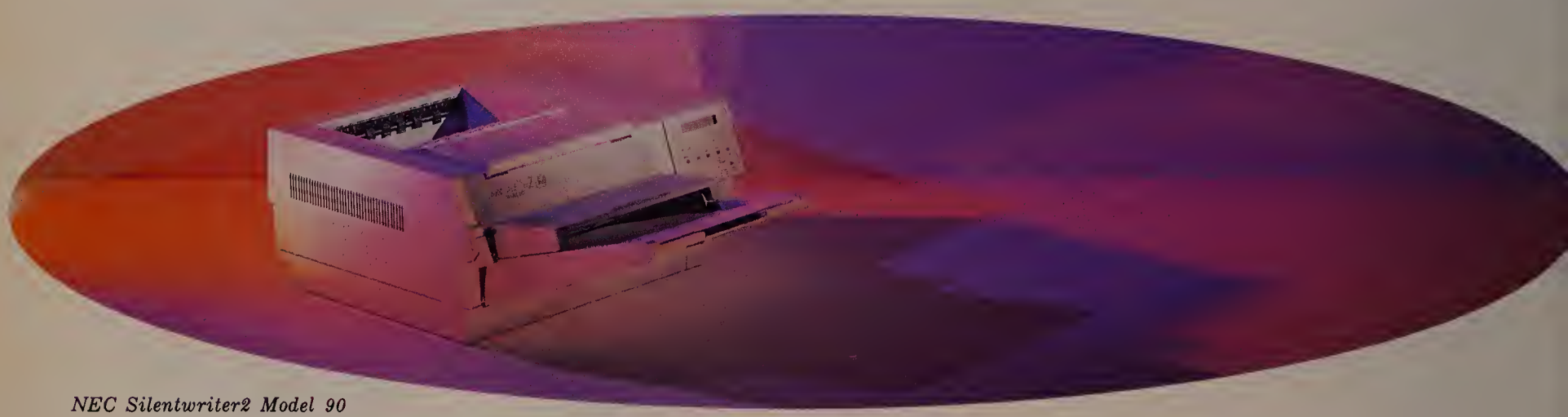
Circle 90 on reader service card

All things being equal, they're not.

They're made by two very good companies. They both have the same great features. Yet, there's one thing that makes NEC's Silentwriter®2 Model 90 look better on paper than the Apple Personal LaserWriter® NT. It's eight hundred dollars less.* Pretty amazing, when you consider how much NEC's



*Apple Personal LaserWriter NT. $3,295***



*NEC Silentwriter2 Model 90 with PostScript. $2,495***

Silentwriter2 has going for it. Of course, it's completely MAC compatible. It also has WYSIWYG screen fonts, 2MB of memory, the ability to do envelopes and the richest blacks you've ever seen. All this and it's MS/DOS compatible and 2PPM faster, too. But most importantly, the Silentwriter comes with Adobe® PostScript®. So whether you're printing newsletters or flyers, sales sheets or shareholders reports, you'll have thirty-five different typefaces to help you create the most dazzling documents possible. For product literature, call 1-800-NEC-INFO. NEC's Silentwriter2 Model 90. Take a close look and you'll find it has no equal.

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**Manufacturers suggested retail price

PC MAGAZINE EDITORS' CHOICE
November 13, 1990
SilentWriter2 Model 90

C&C Computers and Communications

NEC

Circle 257 on reader service card

D data sets at all who don't have some familiarity with FORTRAN or C (you'd have a hard time even generating a serious data set of this type from anything less than a mainframe program). This program is especially useful for inspecting acquired 3-D data—magnetic resonance imaging files would be a good example—rather than the often more symmetrical computed data sets, but the ability of Dicer to export sequences of data slices to View for animation means that the Dicer-View combination is the best way to view *any* kind of suitably formatted 3-D data on a Mac. Despite being Spyglass's most sophisticated program, Dicer is the easiest of the trio to use, and it's one of the few Mac programs to succeed in creating the illusion that you're working with a high-end workstation.

The Strengths

Although Transform and View overlap a bit in function, their strengths are clear: View's color-manipulation and animation make it the basic tool for inspecting 2-D data, Transform is the right program if you need to manipulate data tables without logging back on to the mainframe, and Dicer is the only game in town for serious study of 3-D data sets. They're reasonably priced compared to the alternatives, fairly well debugged for 1.0 versions, and were designed by some of the most experienced scientists in technical graphics.—**Charles Seiter**

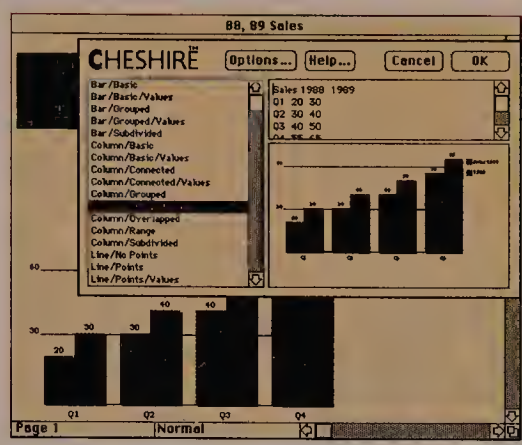
See Where to Buy or circle 719 (Dicer), 720 (Transform), 721 (View) on reader service card.

Chart-Making Utility

CHESHIRE 1.0

Pros: Quick and easy; expandable.
Cons: No pie charts; only charts up to three series of data; main dialog box can't be sent to back; uses of charts not described.
Requires: Mac Plus. **Company:** Abbott Systems **List price:** $125.

If you need to quickly create no-frills charts and place them in documents created with PageMaker 3 and 4, Microsoft Word 3 and 4, MacWrite II, or MacDraw II, you need Cheshire.



Charts to Go After you have entered and selected data in this Microsoft Word document (upper left), you summon Cheshire with a hot key. Select from 21 chart types—I've chosen Column/Grouped/Values—and a thumbnail version of the chart appears. The Options button opens a dialog box that lets you assign font and other chart styling features. Then click on OK to place the chart in your document (lower left).

Indeed, all software should be this easy to use and this useful. I created and placed a thoroughly serviceable chart in Word in less than three minutes. I did it in as few as five simple steps: key in the data, select it, call up Cheshire with a hot key (the program is an INIT), choose from 21 chart types by double-clicking on the one you want, and click on an OK button. The chart is automatically placed in your document. Before you place the chart you can view a fully formatted thumbnail sketch of it in the Cheshire window.

In PageMaker you can resize the chart in the same way you would resize any other graphic. In MacDraw II you can do even more: each of the chart components is a separate object and thus fully editable.

Simple Setup

Cheshire uses a standard tab-delimited format, which means you press the Tab key to separate data on a line and you end each line with a carriage return.

Cheshire lets you select any installed font, size, and style. You can choose whether or not the grid should have white, black, or gray lines and whether or not to use a drop shadow, a background, or a feature called Plot White. Used in conjunction with the background and drop shadow, Plot White gives the effect of reversing out the chart shape, producing a light chart on a dark background. You can also transpose data to switch the x and y axes.

You can edit a chart any time by simply selecting it and calling up Cheshire. The program keeps a record of the data along with the chart—except for those in MacDraw II documents. For MacDraw II you need to save a copy of the data as a text object and select the data each time you want to edit the chart.

True to the program's intent, Cheshire charts are very simple in appearance. They are a no-frills graphic representation of data—rather than splashy infographics à la *USA Today*—that you can quickly paste into a memo, a newsletter, or a report.

Pie Charts en Route

Abbott Systems created Cheshire so that it could be expanded (click on the initial *C* in the Control Panel device for some insight into the program's name). New chart types can be added to the program by dragging them into the Cheshire folder. Unfortunately, this version doesn't include the beloved pie chart. According to the company, the next version should have a pie chart option. Included with Cheshire 1.0 are five types of bar charts, nine column charts, four line charts, and three surface charts.

You can plot up to three data series in any Cheshire chart (and the Line/Points chart accepts up to four data series). But you can't, for example, plot quarterly sales over a four-year period with bar, column, or surface-chart in this version of Cheshire; three years is the maximum.

Another feature I would like the company to address is the immovability of the main Cheshire dialog box. I would like to be able to bring a window from behind the Cheshire main dialog box to the front—to view the placement of a chart, for example—but Cheshire won't budge. You have to close the main window before you can work in any other window.

For the most part, however, if you need quick, no-nonsense charts for direct placement in PageMaker, Microsoft Word, MacDraw II, or MacWrite II, Cheshire is almost guaranteed to bring a smile to your face.

—Philip Bishop

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Circle 364 on reader service card

Application-Programming Software

SERIUS DEVELOPER 2.1

Pros: Crash-proof, bug-proof modular programming; large and rapidly expanding module library. **Cons:** Requires considerable reorientation of programming style. **Company:** Serius Corporation. **Requires:** Mac Plus; hard drive. **List price:** $495.

Serius Corporation promises a lot. It claims that Serius Developer, basically a programming tool kit in which icon-diagrams are used to call and manipulate function and program modules, is better than traditional programming languages for developing custom applications. Remarkably, Serius Developer actually delivers the goods. Within its limitations, it makes possible rapid development of reliable applications that exhibit very little penalty in terms of size or execution speed.

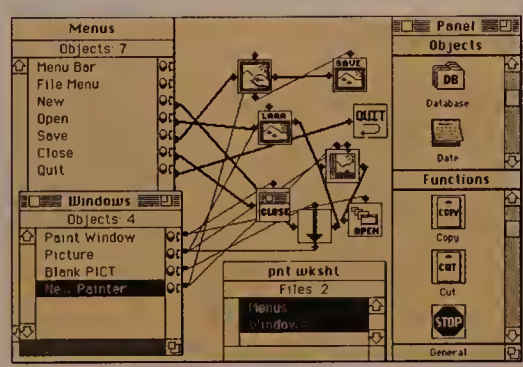
Now for Something Different

Serius calls its program modules objects, and calls the mode in which you connect objects an Object Interaction Protocol. It turns out that these "objects" aren't the same as objects in Smalltalk or C++; Serius's objects are not generally modifiable and do not operate under the same hierarchical organization you would find in a classic object-oriented language.

When you start up Serius Developer, you see a screen with three windows displayed against the programming area: a blank object window, a little window full of usable objects, and another small window that displays sets of functions. The "objects" are in fact modules of compiled code for which Serius has defined a special input/output protocol. The level of sophistication of these objects can be estimated from their names—Database is representative and refers to an object that can be used to generate a custom database application. You start a new program file (called a Worksheet in Developer usage) and start dragging objects into the empty object window. Typically, a first set of objects would construct a menu bar and the File menu common to all Mac applications, and the following sets, in their own object windows, would contain the "action" menus and menu items. Once you have done this bit of definition-by-dragging, you begin work on individual menu items. For Quit, under File, for example, you find the Quit icon in the function window (under General, one of dozens of function sets), haul the icon out to the programming area, and hook it up by drawing a line from the Quit icon to the lower connector that's associated with Quit in its object window. Other File menu items, such as opening or closing windows, require two or three function icons, which, once again, you connect to one another and to menu items simply by drawing lines (see "Fettuccine Code?"). Obviously, if your menu item is going to be Repaginate Document or Fourier Transform things aren't quite so automatic, but Serius has included a huge assortment of high-level functions so that you won't have to resort to the type of ground-floor programming that's awkward to do with diagrams. The plan here is to clear up *all* basic functions when possible; version 3.0 of Serius Developer (scheduled for 1991), for example, offers not only the objects Spreadsheet, XCMD, Linear Algebra, Report, Graph, CL1, and MIDI, among others, but also an aggregate type of abstraction at a level higher than object.

The Big Picture

If you have previously programmed an application for the Mac in Pascal or C, you'll find that constructing applications is three to six times faster with Serius Developer. The final applications carry about 30K to 65K overhead in compiled form over their real-language equivalents, but no noticeable speed penalty. That's a shocking accomplishment and sets Serius Developer apart from other approaches—from Smalltalk to HyperCard—that improve "productivity" at the expense of speed or size in the final program. If you have programmed applications in FoxBase+/Mac or 4th Dimension you'll find the database (especially database search functions), network, and communications sections of Serius Developer surprisingly strong, and will note that applications (in real life *custom application* typically means a hand-tailored database or transactions system for a vertical market) are robust; the Serius system virtually rules out subtle or mysterious bugs. But if you haven't programmed much before, you will find you have a lot to learn and nowhere to learn it. Serius documents its conceptual universe in language that's as correct and terse as a logical proof; it's admirable and complete, but a relatively hispid environment for beginners (who should perhaps work through Symantec's Just Enough Pascal for a fast orientation on the rudiments of Macintosh programming).



Fettuccine Code? With a little sloppiness and a small screen, you can create some truly bewildering diagrams in Serius Developer. Fortunately, the program includes provisions for setting up diagrams in layers and for hiding some functions while you hook up others.

Compilation

Experienced developers report that it takes several months to become comfortable with Serius Developer's icon/diagram programming format, but that this time is rapidly recovered when the first applications are written. Technical support is philanthropically lavish, and besides offering fixes and a score of additional objects for Developer, Serius is planning a text-based nondiagrammatic product that offers the same functionality for 1991. As it stands, Serius Developer is an utterly admirable product; it lets you program at warp speed without loading your compiled program with bulk or execution-speed disadvantages, and it forces, for all the effort of mastering diagram style, rigorously top-down program design. This is, no pun intended, one of the few new programming schemes to take seriously if you program for a living.—**Charles Seiter**

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Circle 342 on reader service card

WINDOW SHOPPING

by Lawrence Stevens

This month I look at a total of 11 products.

Color Convert 1.0

Color Convert ($55 from BugByte) converts 32-bit and 8-bit color images to an 8-color image, which can be printed on an ImageWriter with a color ribbon. The image quality ranges from fair to poor, printing time is very slow, and color-ribbon life is very short.

Color Convert provides a number of features to help you tweak the quality of the image: you can select from two conversion methods, dithering or diffuse; and you can Lighten (add a flat value to all pixels to bring them uniformly closer to white) and Brighten (expand the intensity range of the image by about 15 percent).

To approach acceptable print quality you have to spend some time working with the images. I suggest you print a small sample, change the controls, and try again.

Color Convert does a good job of creating heat transfers for iron-ons (it allows you to print a mirror image). It also works for posters.

Gamblin' Times 3.0

If you want to enjoy gambling without laying out real cash, or if you need something to help you while away the slow periods during your day, Gamblin' Times ($87.95 from Bruce Wilson Advertising) might be the answer. This HyperCard stack is made up of ten games of chance including Craps, Slots, and Roulette (see "Place Your Bets"). Others are informal games such as Liar's Poker and Tic-Tac-Toe. Each game has attractive graphics, many include animation and sound (such as the spinning roulette wheel), and all are programmed to provide (as far as I can tell) realistic odds.

The program includes an accounting module that tracks your fictitious net worth. You begin with

RON CHAN

$5000 in cash, a $22,000 sports car, a $67,000 house, and a $5000 computer. If you lose your cash, you can sell your possessions or you can borrow money at loan shark rates of 10 percent a day. The program provides a continuous assessment of how well you're doing.

Casino Master from Centron Software is a similar program for the serious gambler. Casino Master includes only real casino games, provides options to use different casino rules based on the country in which you expect to gamble, allows you to eliminate the graphics and sound, and includes tips for winning at each game.

Place Your Bets After you place your wager on the roulette table, the ball at the top of the screen spins to the accompaniment of realistic sound effects. If you win, your chips increase.

Gamblin' Times is more attractive, has a variety of games, provides passwords that make it easier to control a multiple-user tournament, and is more fun than Casino Master.

TimeKey 2.0

TimeKey ($99.95 from Mac & Murray) is a set of business-organization stacks that connects client information with projects, costs, and time (see "TimeKey's Linked Stacks").

If you have looked at Focal Point or HyperWorks Organizer, TimeKey's scenario will be familiar. Data is automatically transferred between the calendar, expense, project, and client stacks. For each completed project, the program collects all the relevant information and prints an invoice.

TimeKey, geared for desktop publishers and designers, includes categories for prepress paper and typesetting costs. It also has a time clock, relatively rare in HyperCard applications, that keeps track of the time you spend on a project. (However, you can't turn the clock on and off while in other applications.)

TimeKey has the best screen graphics I've seen in any HyperCard organizer. For example, when you mark a screen for further reference, it appears as a dog-eared page; and time cards are depicted on attractively drawn clipboards.

UltraKey 1.03

A computer is a good tool to help you learn to type. It eliminates the need to juggle books and paper and stopwatches, and it can provide progress charts and reports.

UltraKey ($79 from Bytes of Learning) does a good job of teaching, testing, and charting. Compared

(continues)

to other typing programs, however, UltraKey is relatively expensive and low on features.

Type (from Brøderbund) and Mavis Beacon Teaches Typing (from The Software Toolworks) are less expensive but provide more charts and analyses of your typing. Both programs also recommend specific lessons or drills based on your typing difficulties, and include a typing game—neither feature is found in UltraKey. However, I'm not convinced that all the bells and whistles in Type or Mavis Beacon make it any easier to learn to type.

IFS Explorer 1.02 and Fractal Clip Art

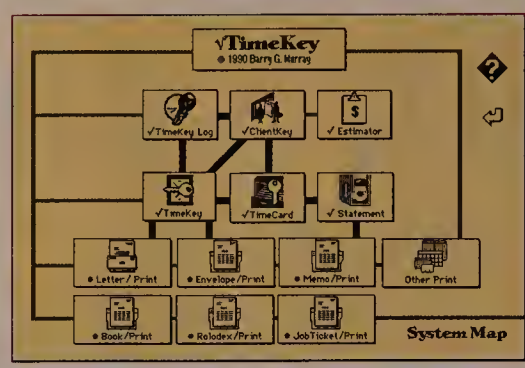
Fractals are intricate geometric shapes made by joining random points on a page. IFS Explorer ($49.95 from Koyn Software) allows you to type in coordinates that represent parameters, and IFS chooses the random points. The program then begins the process of drawing the points and linking them together. As IFS Explorer draws the fractal, a box displays a running total of the number of points drawn. When the fractal is completed to your satisfaction, you can stop the drawing process. To view the intricacies of your fractal, IFS Explorer lets you zoom up to 100 million times.

Fractal Clip Art ($37.95 from Koyn Software) contains PICT images that were made using IFS Explorer (see "Intricate Designs"). These designs, which look like shapes often found in nature, are much more intricate than typical clip art.

If you're studying fractals, IFS Explorer is an excellent alternative to using the fractal program on a college's minicomputer. But if you just want a way to draw complex shapes for design work, the process of figuring out how to create images by typing in coordinates will probably be more work than it's worth.

Balloon Stack

Balloon Stack ($35 from BugByte) teaches you how to twist balloons into animal shapes. Most of the books on this subject use either photographs or line drawings. Balloon Stack uses both. The program first displays a scanned photo showing what each finished figure should look like. Then it displays clear line drawings showing



TimeKey's Linked Stacks Data from any stack can find its way into any other stack. This map shows how the stacks are related.

Intricate Designs Above are three examples of fractals, intricate geometric shapes created by IFS Explorer.

Balloon Animals Balloon Stack's line drawings provide easy-to-understand instructions showing how to make animals out of balloons.

where to make the twists (see "Balloon Animals").

The figures are divided into beginner, intermediate, and advanced. If you ever wanted to entertain at a children's party or just impress your friends or family with your hot air, this is an excellent buy.

The Mac Is Not a Typewriter, The Little Mac Book,

The Little Mac Book, by Robin Williams ($12.95 from Peachpit Press), is a thin volume (about 100 pages) that describes the basics of using a Mac. It covers menus, windows, use of the mouse and keyboard, as well as simple troubleshooting techniques.

The Mac Is Not a Typewriter, also by Robin Williams ($9.95 from Peachpit Press), is a thinner volume (72 pages) that teaches the basics (very basics) of desktop publishing. It shows you how to create such things as curly apostrophes and quotations marks, em dashes, and justified text.

Both books walk you through the material in easy-to-follow steps. For the beginner only, these books provide a clear, witty, and thoroughly pleasant way to learn how to use the Mac to best advantage.

ClickArt EPS Symbols & Industry, ClickArt EPS Animals & Nature, and ClickArt EPS Sports & Games

These packages ($129.95 each from T/Maker Company) contain traditional images. While there is very little that's startling in these sets of PostScript clip art, each package includes a nice variety of well-drawn and eye-pleasing images.

Symbols & Industry Volume 1 is preponderantly military and medical and includes an ambulance, an eye chart, a missile, and a military jet. Animals & Nature includes pets, wild animals, insects, and two plants. Sports & Games includes images for 25 team and individual sports. These are excellent sets for general office or home use.

WillMaker 4.0

WillMaker 4.0 ($69.95 from Nolo Press) asks you a series of questions and then generates a will. It lets you designate specific assets to pay debts, name a property manager, and create complicated beneficiary structures.

The latest version of WillMaker includes new laws and new techniques for estate planning. One major addition allows you to use a provision of the Uniform Transfer to Minors Act to set up custodianship of property transferred to children. The online help has been expanded and can be exported into a word processor for custom formatting.

If your will is relatively straightforward, and you have an earlier version of WillMaker, there is no need to upgrade. But if you're shopping for a will program now, WillMaker 4.0 is extremely comprehensive. ■

See Where to Buy or circle 606 (Balloon Stack), 615 (ClickArt), 618 (Color Convart), 632 (Fractal Clip Art), 633 (Gamblin' Times), 641 (IFS Explorer), 650 (The Little Mac Book), 653 (The Mac Is Not a Typewritar), 732 (TimaKey), 734 (UltraKey), 739 (WillMakar) on reader service card.

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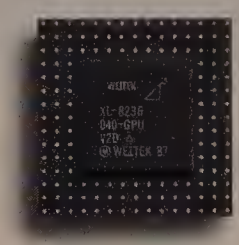

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AppleLink: D1656 • Compuserve: 76004,1611

Circle 116 on reader service card

NEW PRODUCTS

Edited by Mary Margaret Lewis
This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

20-Inch Trinitron Display

20-inch Trinitron color display system that has 8-bit performance; up to 256 colors; 1024-by-768-pixel resolution; and a screen-refresh rate of 74.6Hz. Display software includes pop-up menus; enlarged cursor and menu bar options; a screen saver; and a screen-copy feature. $2997. Mirror Technologies, 612/633-4450.

20-Inch Trinitron Display

Athena Hard Drives

Line of compact external hard drives with cases 5 3/4 inches wide to match the width of Mac II–series cases when hard drive is placed vertically. Drives have an average access time of 17ms, push-button SCSI address selection, and a five-year warranty. 50MB model $8991; 100MB model $1549. Microtech International, 203/468-6223, 800/626-4276.

Athena Hard Drives

Expanse NB4 and Expanse II Cards

Boards designed to extend the single Processor Direct Slot capability of the Macintosh IIsi to four and eight Mac II NuBus board slots. Expanse NB4 board lets a Mac IIsi run four Mac II NuBus boards simultaneously; Expanse II board lets a IIsi run eight Mac II NuBus boards simultaneously. Expanse NB4 $1295; Expanse II $2295. Second Wave, 512/343-9661.

Kodak Diconix Color 4 Printer

Color version of the portable Kodak Diconix printer. The Color 4 printer uses cyan, magenta, yellow, and black ink for the four-color printing process. Prints at resolutions of up to 192 by 192 dpi and comes with the ability to print in near-letter-quality mode. $1595. Kodak, 800/255-3434.

Kodak Diconix Color 4 Printer

Microwriter Agenda

Hardware unit designed as a word processor, notetaker, and daily planner. Comes with a *chorded* keypad, which enables you to enter text by pressing a combination of keys with one hand. Files can be uploaded to the Macintosh, or created in ASCII for uploading to any other computer system for printing. Plugs in to the modem port. $390. Institute for Applied Research, 415/843-4503.

Microwriter Agenda

Phaser II Series

The Phaser II SX is a 300-dpi color printer that uses a memory-efficient controller, relies on the host computer for image processing, and uses direct parallel or SCSI interfaces. The Phaser II PX is a PostScript-compatible printer that uses an intelligent multitasking interface to provide parallel, serial, and AppleTalk ports that can be used individually or simultaneously to connect to IBM PCs, other Macs, and workstations. Phaser II SX $4995; Phaser II PX $7995. Tektronix, 503/685-3585.

Phaser II Series

PM 9600 SA V.32/V.42bis Modem

SA V.32/V.42bis portable modem that features error control and supports V.32, V.42bis, and MNP Class 5 error-correction protocols, and data compression of V.42bis and MNP Class 5. Compatible with all current domestic and most international modem types. $699. Practical Peripherals, 818/706-0333.

PM 9600 SA V.32/V.42bis Modem

SD-340 Disk Drive

FDHD SuperDrive–compatible floppy drive; works with 1.4MB and 800K disks. Works with all Macs. Compatible with Apple IIGS. $279. Sprite, 408/773-8888.

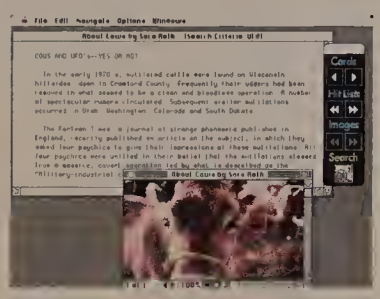
(continues)

SD-340 Disk Drive

SOFTWARE

About Cows

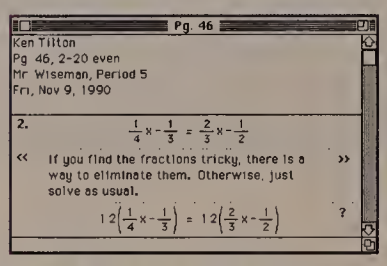
Database of text and images derived from the North-Wood Press volume *About Cows* (1987) by Sara Rath. Contains images of the animals in various bovine poses. Reveals history, myths, literary references, and trivia about cows. 1MB min. memory. $39. Wayzata Technology, 612/447-7321, 800/735-7321.



About Cows

Algebra I Homework Tutor

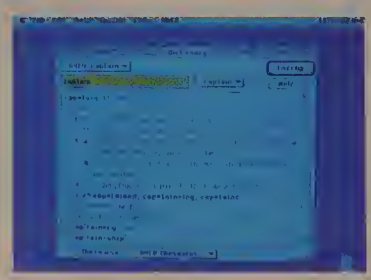
Software designed to act as an algebra tutor. Student enters algebra problems in topics such as monomial and polynomial operations; equations; factoring; algebraic and complex fractions. Student can prompt the program to generate hints, or to generate a similar problem that will help him or her learn how to solve the problem. The computer checks for accuracy at each step of the student's progress in solving a problem. 1MB min. memory. $120. Missing Link Software, 212/787-6936.



Algebra I Homework Tutor

American Heritage Electronic Dictionary

Reference and writing tool that works as a DA and is compatible with most Mac applications. Provides users with quick access to the American Heritage Dictionary. Search feature enables users to find words when only a definition, vague meaning, or related concept is known. Also comes with the complete Roget's II Electronic Thesaurus. 1MB min. memory. $89.95. Houghton Mifflin, 617/252-3098, 800/633-4514.



American Heritage Electronic Dictionary

ClickArt EPS Symbols & Industry, Volume 1

Collection of more than 260 PostScript images created by professional artists. Includes general business images and international symbols in categories such as people, finance, travel, and politics; military armaments and ranks; and sci-

ClickArt EPS Symbols & Industry, Volume 1

With the HP ScanJet Plus, you've

The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

That means 256 shades of gray for the hottest-looking output from your Mac. And it's so easy, too. At the click of a mouse, you can get negative or mirror images, as well as scaling in 1% increments from 4-200%. All for $2,190,* about what you would expect to pay for a 4-bit scanner.

So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call **1-800-752-0900, Ext. 1005** for your authorized HP dealer.

There is a better way.

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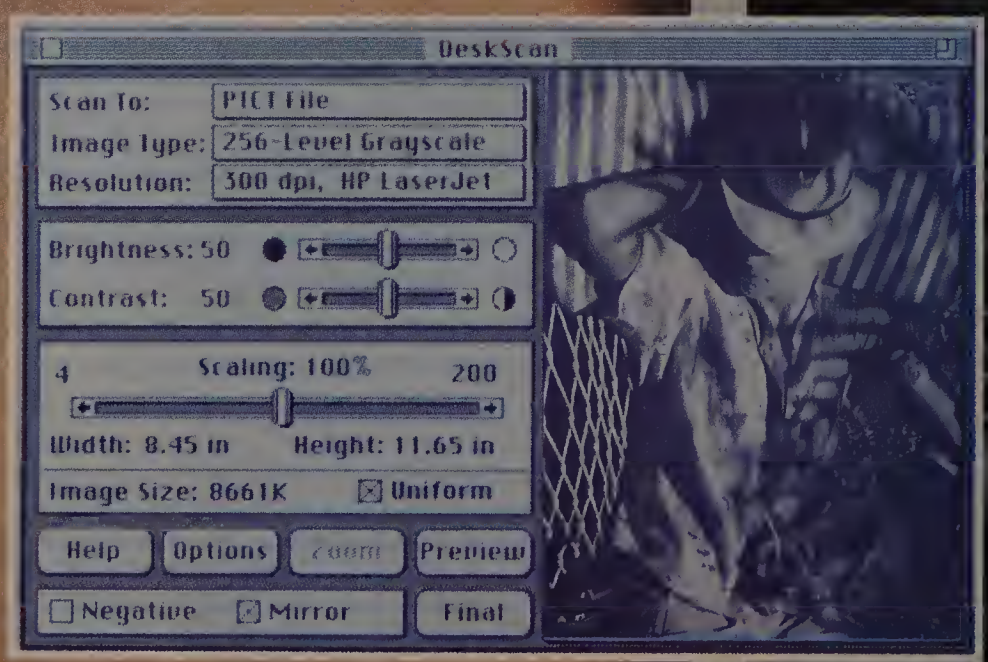
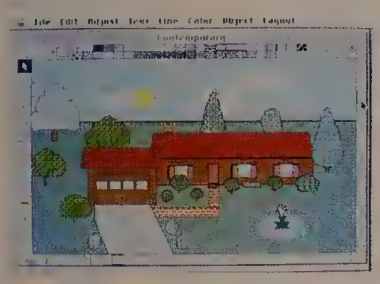


For all its amenities, ease of use, good image quality, and low price, *Publish!* recommends the HP ScanJet Plus as their "Best Buy."

ence and engineering symbols and equipment, such as tools, parts, and instruments. 1MB min. memory. $129.95. T/Maker Company, 415/962-0195.

Design Your Own Home, Landscape for the Mac

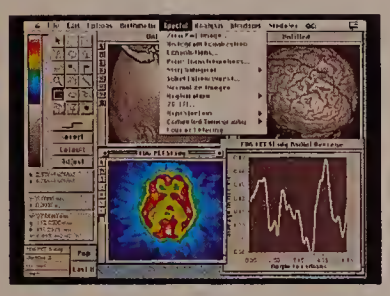
Object-oriented landscape-design package that lets homeowners and professionals see how various tree and shrub arrangements will look around a home now and in the future. Users define the external features of a house, then place a variety of predrawn trees, shrubs, and yard objects around the house from a top view. Trees and bushes can be aged in the top view and four side views to give a picture of how the landscape will appear over time. 1MB min. memory. $99.95. Abracadata, 503/342-3030.



Design Your Own Home, Landscape for the Mac

DIP Station

Interactive image processing application that can be used in conjunction with spreadsheets and presentation packages. Supports three-dimensional images and has a proprietary 16-bit floating-point pixel format and an image processing library. Included User Support Module provides essential links between user-written programs, DIP Station, and the image processing library. 4MB min. memory. $495. Hayden Image Processing Group, 216/721-2388.



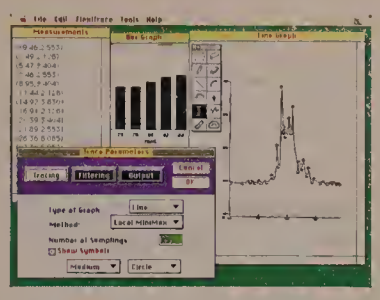
DIP Station

Escape

Keyboard remapping utility for the Mac Classic and Mac LC keyboards. Enables user to swap the position of the Escape and tilde keys on the new keyboards so they match those used in the standard Macintosh keyboard layout. 1MB min. memory. $19.95. Beagle Bros., 619/452-5500.

FlexiTrace

Data-acquisition software that converts hard-copy graphs and charts into the numerical data that was used to produce them. Analyzes a digitized line, area, bar, or scatter graph and returns the Cartesian coordinates and the area of regions within the image. Uses a palette of tools similar to those in MacPaint. 1MB min. memory. $249. Tree Star, 805/682-4096.



FlexiTrace

The Hunk Manager

Programming tool designed to be used with Pascal or C language compilers for data-storage and -retrieval functions. Provides a library of routines that are the analogues of those used in

(continues)

got it made in the shades.

*Suggested U.S. list price. © 1990 Hewlett-Packard Company PE12004

the Resource Manager, without the limitations imposed by the Resource Manager architecture. 1MB min. memory. Single-user version $295; multiuser version $395. The Gettys Group, 312/836-4222.

Jack Nicklaus Presents the Major Championship Courses of 1990

Third in a series of add-on course disks to be used with Jack Nicklaus' Greatest 18 Holes of Major Championship Golf. Contains simulations of the host grand-slam courses of last year's U.S. Open, British Open, and PGA Championship. Presents computer golf fans with the opportunity to play on the same courses the professionals played on during the 1990 summer season, and challenges Mac golfers to beat the scores of their professional counterparts. 1MB min. memory. $21.95. Accolade, 408/985-1700.

Jack Nicklaus Presents the Major Championship Courses of 1990

MacMeter

Graphical performance-measurement and -monitoring utility. Generates simple charts and graphics to illustrate in real time which applications are running and how the Mac is dividing its CPU time among applications, the system, the ROM, and the Finder. Works across an AppleTalk network to show administrators and other users the CPU activities on remote machines. 1MB min. memory. Starter kit $179; network 10-pack $750; 100-pack $6000. TerraNetics, 213/882-6013, 415/962-8652.

MasterPlan

Project-planning and resource-management software that performs traditional project-planning tasks such as Gantt and PERT chart representations, as well as specialized functions such as "what-if" projections, cost-analysis charts, and resource-management and resource-loading histograms. 1MB min. memory. $249. New Latitudes, 415/563-8727.

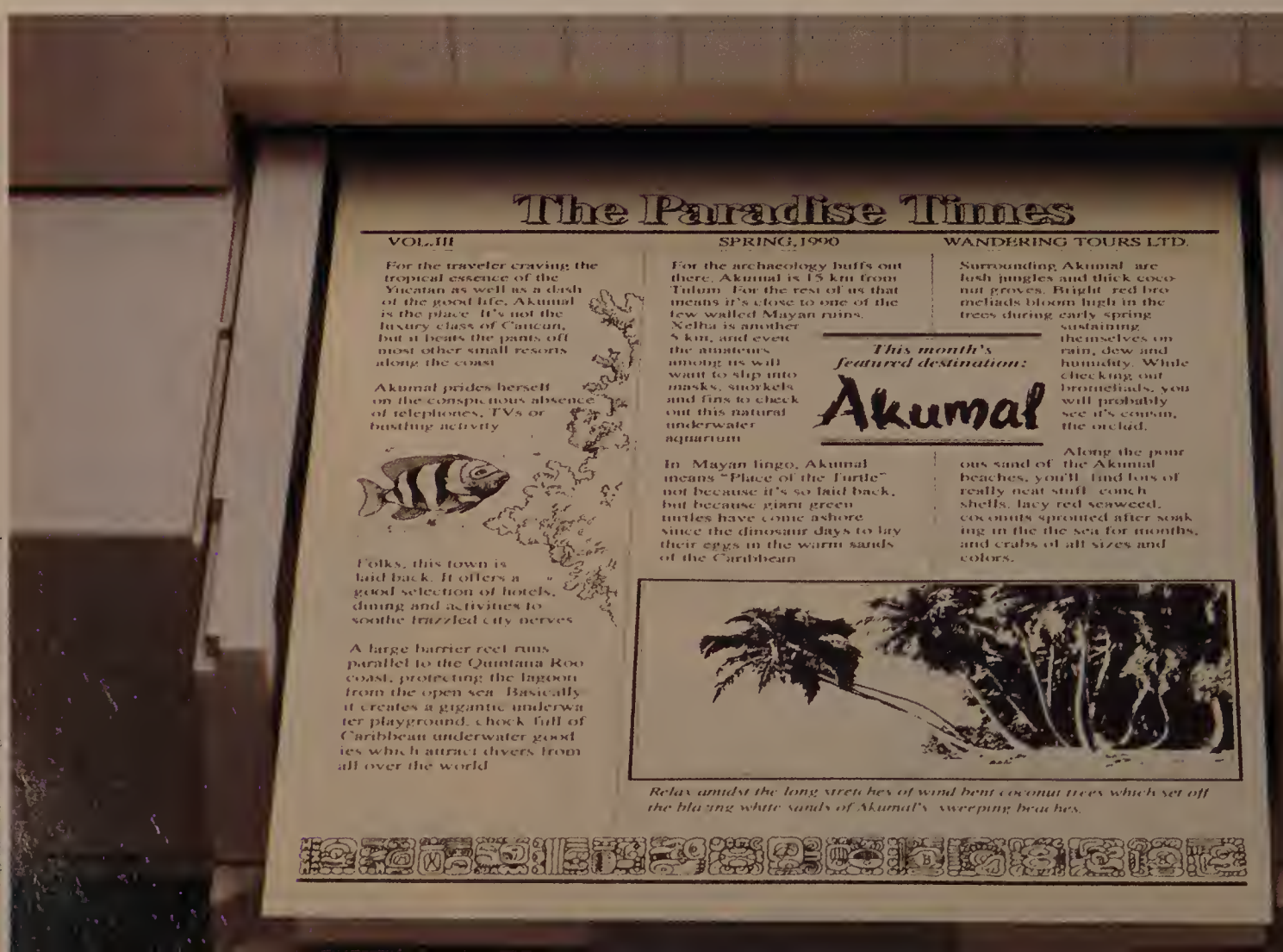
Metronomefont

Type 1 laser font designed to enter metronome markings, proportions, and figured bass notation for musical scores. Optimized for convenient entry in word processors and page-layout programs. Compatible with all Mac systems and PostScript printers; includes double and triple screen sizes for use with dot matrix printers. 1MB min. memory. $12.95 plus $3 s/h. DVM Publications, 609/853-5580.

MIBAC Music Lessons

Music tutor that helps the user learn the elements of music theory at his or her own pace. Provides drills for mastering note names, circle of fifths, key signatures, major and minor scales, modes, jazz scales, scale degrees, intervals, note durations, and ear-training. Each drill has several levels of difficulty. Includes online help. 1MB min. memory. $89.95. MIBAC Music Software, 507/645-5851.

With the HP DeskWriter, you can



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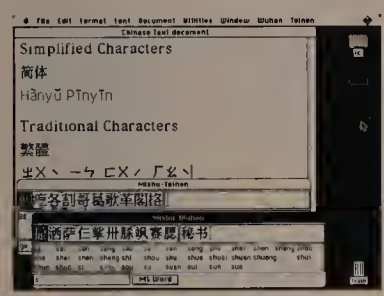
Documents created using Microsoft® Word and Aldus PageMaker.®
Microsoft is a U.S. registered trademark of Microsoft Corp.
PageMaker is a U.S. registered trademark of Aldus Corporation.

Mishu-Wuhan

Desk accessory that enables Chinese characters to be inserted into nearly all Mac documents. Enables the user to select characters displayed in a separate desk-accessory window and paste them into the document window beneath. Comes with a glossary of all characters and their pinyin equivalents. 1MB min. memory. $259. Xanatech, 617/492-7463.



Mishu-Wuhan

Optix Desktop Imaging System

Desktop imaging system that enables you to index images with either the built-in database or a database of your choice, such as SQL, Oracle, or Informix. Presents an entire multipage document as a series of miniature images; performs image enhancements such as noise removal, edge tracing, and rotating; and has a selection of MacPaint-style tools. 2MB min. memory. $495. Blueridge Technologies, 703/675-3015.

Org Plus for Macintosh

Software that automates the process of drawing organization charts. User enters names, titles, and other facts; the program draws and spaces the boxes and lays out the connecting lines. Users can choose from more than 50 chart, box, and line styles to achieve a particular look. 1MB min. memory. $195. Banner Blue, 415/794-6850.

Professor Mac

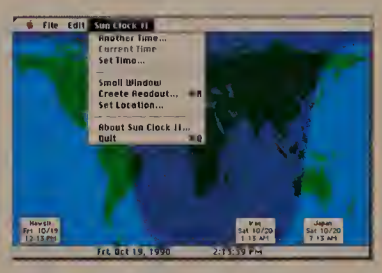
Electronic tutorial for the Macintosh that provides step-by-step lessons, exercises, and quizzes that cover the range of topics necessary to benefit from using the computer. Some of the areas covered: learning basic principles such as cut, copy, and paste to the Clipboard; mastering MultiFinder; using networks and communications software effectively; printing; how to select appropriate programs for a variety of applications; and using HyperCard. 1MB min. memory. $49.95. Individual Software, 415/595-8855, 800/331-3313.

Quick Card

Software for creating business cards. Enables you to print two-sided cards, vertical cards, and multicolor cards and to use a foil overlay to create an engraved appearance. Compatible with any computer font and with any graphics format. Prints any image on the Clipboard. Program can automatically scale images to fit, or you can scale them manually. 512K min. memory. Quick Card Kit $39.95; paper for 250 business cards $32. Shaffer Software, 408/252-1972, 800/735-3450.

Sun Clock II

Color DA (also available as screen saver) that displays a map of the world and the position of the sun for any



Sun Clock II

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have it all. (But keep it to yourself.)

The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and Apple Talk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call **1-800-752-0900, Ext. 1004** for your authorized HP dealer.

There is a better way.

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given date and time. The shape that divides day from night changes with the seasons so the user can see the days lengthen and shorten as the year progresses. 512K min. memory. DA $40; screen saver $10. MLT Software, 503/220-5999.

ACCESSORIES

ColorTrans

Foil that makes color-engraving effects on laser-printed documents. Plastic film creates the same effects in laser printers or dry-toner copiers. Uses the heat and pressure of a laser printer or dry-toner copier to transfer color onto the printed page. Available in gold, silver, red, blue, green, violet, pink, and turquoise. 12 sheets of single color or 8 sheets of different colors $24.95. LTR, 408/441-9920.

Command Console

Surge-suppression unit with compact metal cabinet that fits under computer monitor. Provides central system control from lighted switches to power the computer, printer, and peripherals. Uses isobar-level spike, line-noise, and RFI/EMI suppression to protect all connected equipment. $124.95. Tripp Lite, 312/329-1777.

Command Console

Hanging Disk Filer

Hanging disk filers that come in letter and legal size, hold up to six 3½-inch or 5¼-inch disks, and can be stored in a filing cabinet. Filers are color-coded and available in red, green, yellow, and blue. Optional clip-on tabs are available. Sold in packages of five. 1 to 4 packages $7.95 each; 5 to 19 packages $6.95 each; 20 or more packages $5.95 each. Eaton and Associates, 415/550-0325.

Hanging Disk Filer

Mouse Lap Pad

Device that attaches a mouse pad to user's leg to free up desk space. Consists of two elastic bands that attach to a plastic mouse-pad holder. $19.95. PrecisionLine, 612/475-3550.

Strip Switch

Device that uses the power-on key found on all ADB keyboards to control the power to the Mac and peripherals. Plugs in to the wall outlet and enables the keyboard power-on key to turn on the Mac SE; lets user set a time delay between the time the external peripherals turn on and the time the Mac II turns on. $89.95. Practical Solutions, 602/322-6100.

Strip Switch

Tru-Grip

Security device for computers, peripherals, and other office equipment.

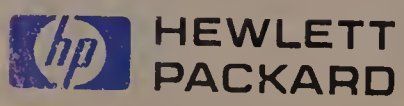
Pigments for your imagination.

HP color printers let you draw splashy color from your Macintosh.

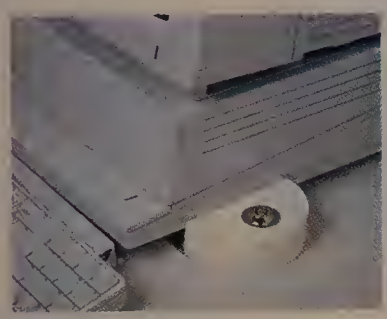
Entertain your thoughts with HP's PaintJet and PaintWriter XL color printers. Both are fully Mac-compatible and let you use all Quickdraw-based software applications. That means high-quality Macintosh II output in 16.7 million colors.

Print on paper or transparencies with 13 scalable outline fonts. And for shared use, the PaintWriter XL offers AppleTalk, faster speed, and auto sheet feed. For sample output and the name of your authorized HP dealer, call **1-800-752-0900, Ext. 1167.**

There is a better way.



Designed to fit most flat-bottom or flat-sided office equipment to secure units to a desk or table. Helps to prevent theft, as well as damage during sudden movement such as that caused by an earthquake. $79.95. Jeff Fidler and Associates, 619/321-2125.

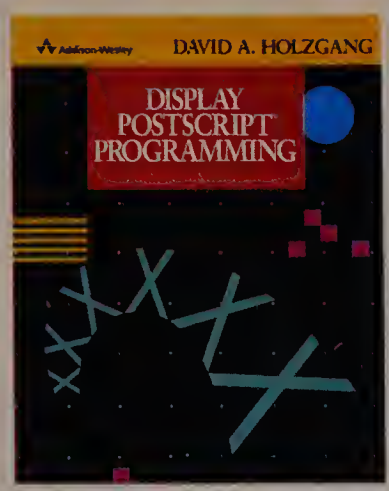


Tru-Grip

BOOKS

Display PostScript Programming

Book about Adobe's Display PostScript language. Written by David Holzgang, PostScript author. $24.95.

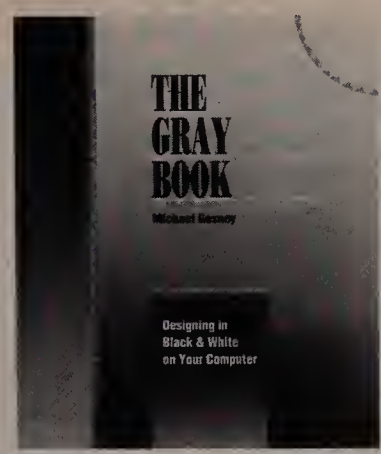


Display PostScript Programming

Addison-Wesley Publishing, 617/944-3700.

The Gray Book: Designing in Black & White on Your Computer

Book that discusses how to work with contrast and reverses, screens and solids, and 3-D designs and lighting effects while creating black-and-white images on the computer. Contains a section devoted to illustrations and logos created in



The Gray Book: Designing in Black & White on Your Computer

black, white, and gray; designed to be used as an idea bank. $22.95. Ventana Press, 919/942-0220.

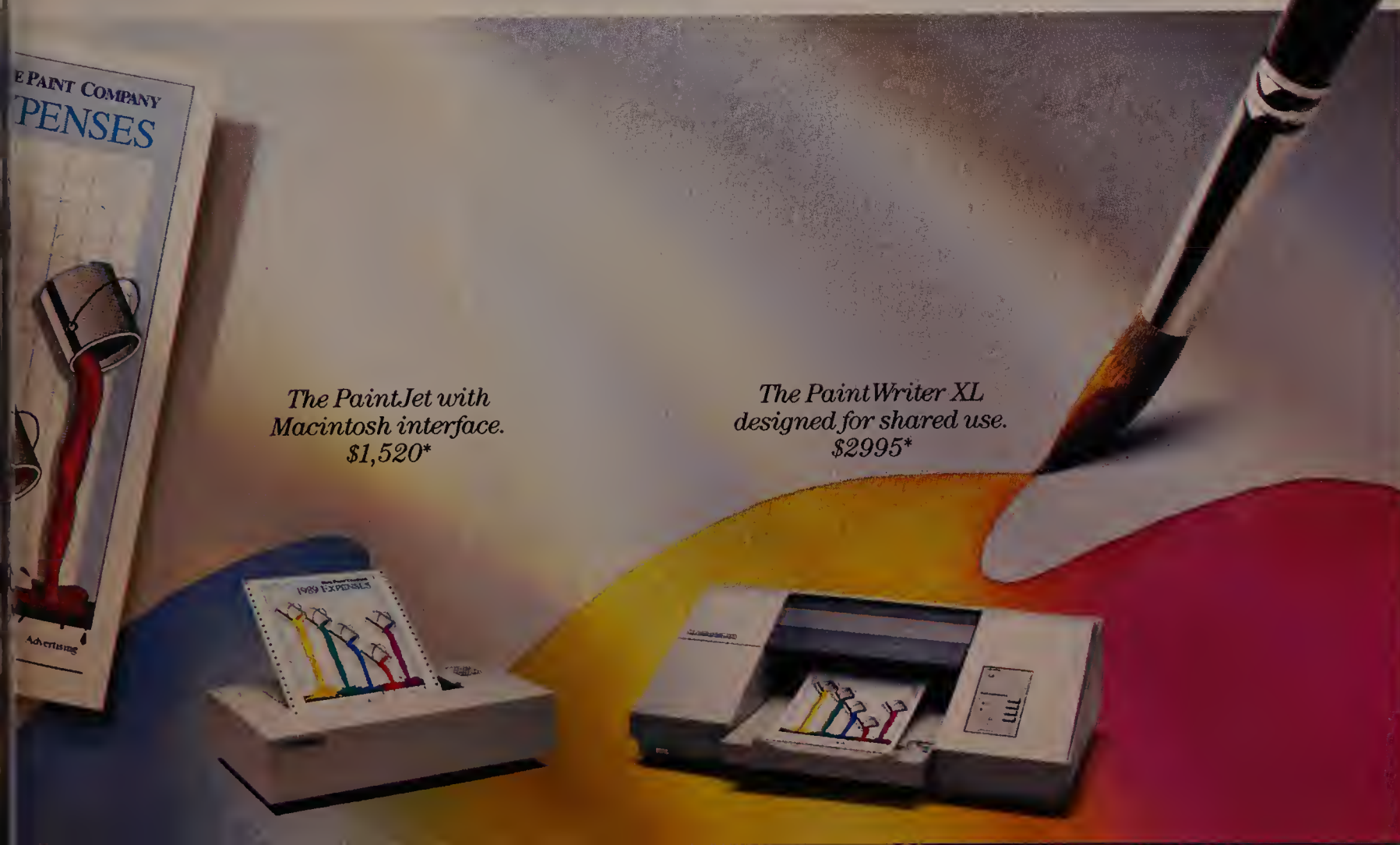
Linotronic Imaging Handbook

Guide for users of Linotronic imagesetters. Book is 228 pages long and focuses on desktop publishing and graphics applications of PostScript-equipped Linotronic imagesetters. Written by James Cavuoto and

Linotronic Imaging Handbook

Stephen Beale. $27.95. Micro Publishing Press, 213/371-5787.

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107.



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Introducing the accounting software that does just what you need it to do.

Everything.

ACCPAC® accounting software was designed specifically for businesses like yours—so you can spend less time balancing your books and more time building your business.

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That's why today, ACCPAC is the best-selling accounting software in the U.S. and Canada. All kinds of businesses in every type of industry trust their books to ACCPAC.

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We'll Take Care Of Your Books.

ACCPAC BEDFORD INTEGRATED ACCOUNTING and ACCPAC BPI run on PC/DOS.

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Circle 10 on reader service card

Quick Tips

Multiple System Folders, radio-button and check-box clicking, surge suppression, and more

BY LON POOLE

Judging from this month's mail, a surprisingly large number of people know about and use Microsoft Word's formula-making commands. Philip Mahler of Carlisle, Massachusetts, and many, many others recommended using the formula commands to continuously underline subscripted and superscripted text. The advantage of this method over the one I described in last November's *Quick Tips* (using the Borders option of Word's Paragraph command) is that it works within a paragraph of nonunderlined text, making it unnecessary to create a separate paragraph for the text you want underlined.

To prepare for entering formula commands, choose Full Menus and Show ¶ from Word's Edit menu. Then with the insertion point where you want the underlined text, press ⌘-Option-\ to insert a formula mark, which looks like a period closely followed by a backslash (.\). Next type the letter X, again press ⌘-Option-\, type the letters BO, and finally, in parentheses, type or paste the text you want underlined. To see the underlined text, choose Hide ¶ from the Edit menu. "Continuous Underlines" shows this method in use.

Another underlining method, suggested by David S. Allan of Glenview, Illinois, and others, is to type the text you want underlined, select it, and press ⌘-Option-D to copy it as a graphic. Then paste the graphic in place of the text you typed and apply Underline style to the graphic. To get spacing exactly as you want it, you may have to subscript or superscript the graphic and experiment with its cropping box. Note that you cannot edit a graphic. If you think you may want to change the text after making it an underlined graphic, format the original text as hidden text and paste the graphic next to it. Word doesn't normally print hidden text.

Scroll Speed

You don't need a Mac with a 68030 CPU to scroll long menus at two speeds as I claimed in an addendum to one of last November's tips. (To scroll slowly, place the tip of the pointer at the base of the arrow at the bottom of the menu. To scroll quickly, move the pointer to the tip of the arrow.) Mike Tilley of Greenbelt, Maryland, and other readers use this technique with the Apple menu on Mac Plus and Mac SE models as well. However, long menus in Microsoft Word, MacWrite II, and possibly some other programs scroll at only one speed on a Plus, SE, or Mac II.

Replacement Switch

Q The restart switches on my Mac SE and Mac II are broken. Why don't the local distributors (at least in Israel) stock spares? Where can I buy them?

David Darom
Jerusalem, Israel

A At this writing, you can order them for $7 each from Shreve Systems, 2421 Malcolm St., Shreveport, LA 71108; 318/635-1121 (800/227-3971 within the United States).

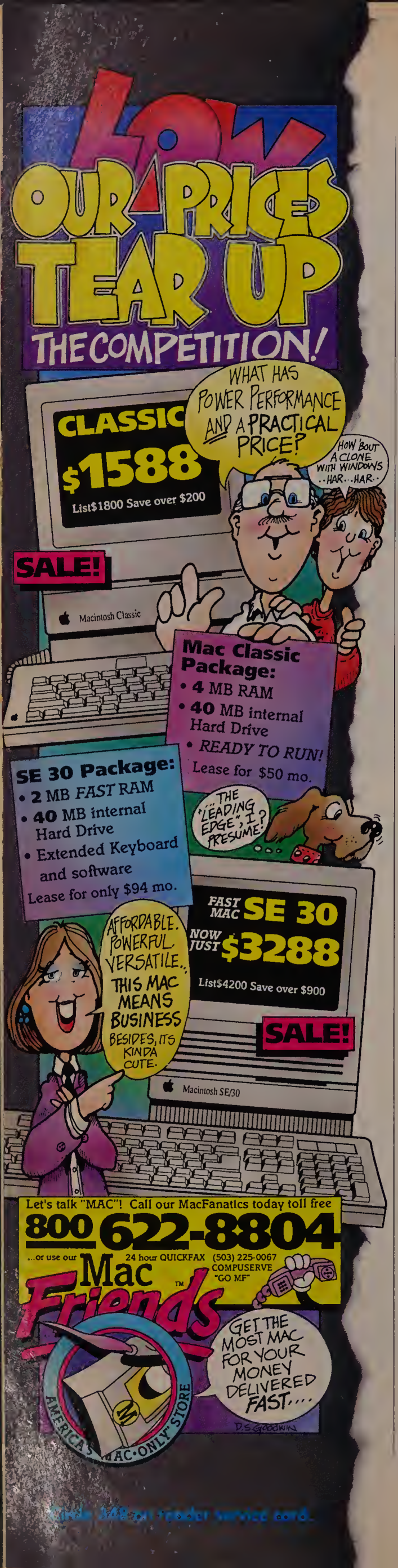
Hard Disk Confusion

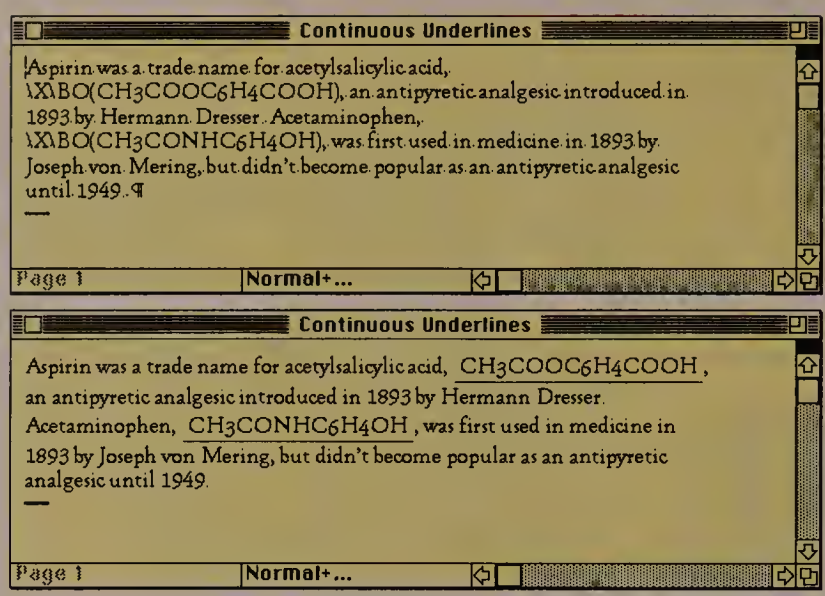
Q I'm a computer novice who's very confused. My Mac SE's internal hard drive was nearly full, so I purchased an external hard drive. I thought it would be simple to plug in and use. Not so! The external one has now become the start-up disk. I didn't choose it; the computer did. Do I have to have a System Folder on both hard drives?

Judith Girod
Oakview, California

A You need a System Folder on only one hard drive. But you can have one System Folder on each and use the Set Startup section of the Control Panel to select the drive whose System Folder the Mac will use during start-up. That one is called the start-up disk. Each System Folder can contain a different combination of fonts, desk accessories, Control Panel sections, and other system enhancements. Because of the potential for confusion, however, each hard drive should have only one System Folder. To check for multiples, use the Find

(continues)





CONTINUOUS UNDERLINES Use a Microsoft Word formula (top) to put a continuous underline beneath superscripted or subscripted text within a paragraph of nonunderlined text (bottom). Formulas are visible when the Show ¶ command (Edit menu) is selected.

File desk accessory in the Apple menu to search each drive for the word *Finder* (any folder that contains a Finder and a System file is considered a System Folder—regardless of its name). Before dragging extra System Folders to the trash, make sure they don't contain any items you want to keep.

Normally the Mac sticks with the System Folder on the start-up disk. But if the start-up disk was a floppy and you open an application on another disk that contains a System Folder, the Mac automatically switches to that System Folder. You can force a switch by pressing the Option key while opening a program on a different disk or by pressing the Option and ⌘ keys while double-clicking the Finder icon on another disk. However, the Mac won't switch System Folders at all if MultiFinder is active.

Can't Quit MultiFinder

Q Switching from the Finder to MultiFinder is very easy using the utility ToMultiFinder. However, I have not found a way to conveniently switch back to the Finder without restarting.

David J. Vess
Rowland Heights, California

A Unfortunately, there's no way to turn off MultiFinder without restarting. To temporarily deactivate it, hold down the ⌘ key from the time the Welcome to Macintosh message appears until you see the Finder's menu bar. If you want MultiFinder always inactive, use the Finder's Set Startup command (Special menu) before restarting. Of course, you can also use ToMultiFinder to activate or deactivate MultiFinder at start-up time. ToMultiFinder is available from online information services (ToMultiFinder 4.0 in the Utilities section of America Online's software library) and from user groups.

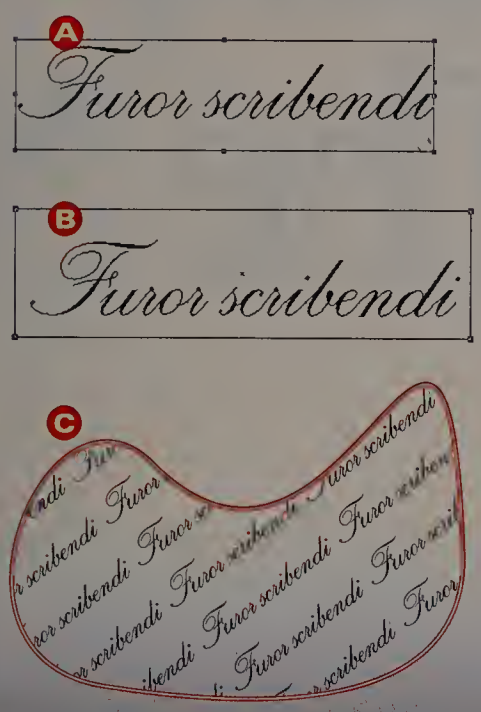
Surge Suppression

Q The electricity in my dorm room seems extremely sensitive to power surges precipitated by other devices in the building. For example, bands of snow frequently flash across my TV screen. Sometimes these glitches interrupt my entire TV screen for a fraction of a second. I'm about to get a Mac SE/30 and do not want to plug it directly into my dorm-room power outlet. I know there are a lot of surge protectors on the market, but what do I need to know about them in order to make an intelligent purchasing decision?

Karl Kracht
Ann Arbor, Michigan

A Transient voltage variations can occur whenever electrical devices in the building are switched on or off, whether manually or automatically. The Macintosh power supply can handle small voltage variations but not variations of several hundred volts, which heavy-duty electrical devices—especially motor-driven devices such as refrigerators, air conditioners, furnaces, and fans—can cause. These surges can cause data loss or a system crash but do not usually result in a trip to the repair shop. However, lightning and other static discharge can generate spikes of over 1000 volts and can

Text Tiles



Tiled fills in Aldus FreeHand can be made up of text as well as graphics. The method, submitted by Giovanni Gotti of Dongo, Italy, is illustrated below.

Type the text **(A)**. Surround the text with a rectangle **(B)**. (The space between the text and the edges of the rectangle determines the spacing of the tiles in the filled area.) With the rectangle selected, choose None from the Fill and Line menus. With both the rectangle and the text selected, choose Group from the Element menu. Copy the group. Draw a shape to be filled **(C)**. Choose Tiled from the Fill menu. In the dialog box that appears, enter the desired fill angle, click the Paste In button, and then click the OK button.

damage a computer (and other electronic equipment). Surge protectors contain electronic components called *metal-oxide varistors* (MOVs), or simply *varistors,* to suppress transients above a stated voltage. Look for a three-varistor surge protector that suppresses transients above a threshold no higher than 400 volts. Cheap surge protectors may contain only one varistor, which can't provide adequate protection in a grounded device (one with a three-prong plug). Another worthwhile feature is an indicator light that shows whether the surge protector is working. (For more information on power problems and power-protection equipment, see "Getting Started with Power Protection," *Macworld,* February 1991.)

All equipment connected to a Mac via serial or SCSI cables should be surge-protected. That includes an ImageWriter printer, a hard drive, and a modem. Not only can voltage transients damage those peripheral devices, they can also travel to the Mac along the serial or SCSI cable. Modems are susceptible to voltage transients from the phone wiring as well as from a wall outlet. You can get either a separate phone-line surge protector or a combination phone-line and electrical surge protector.

A surge-protected system may still be at risk if it's connected to an AppleTalk network using telephone cabling. PhoneNet modules made by Farallon Computing include surge protection, but Apple's LocalTalk modules do not. Therefore, you should not connect a Mac or any networked device directly to the phone jack using an Apple LocalTalk module and a LocalTalk-to-PhoneNet converter cable. It's OK to use an Apple module and a converter cable to connect one network device to another. Surge protection isn't needed on network wiring that uses only Apple modules and cabling (no phone cable at all) because the Apple cable is shielded.

In addition, your system is susceptible to radio-frequency interference (RFI) and electromagnetic interference (EMI). This may be what's bothering your TV. The better surge protectors also include filters to take care of RFI and EMI.

Delayed Mount

TIP: Normally, SCSI hard drives are recognized when you start up the Mac. If a hard disk platter isn't spinning at its full speed or the drive is turned off at start-up time, its icon won't appear on the desktop. You can mount the

(continues)

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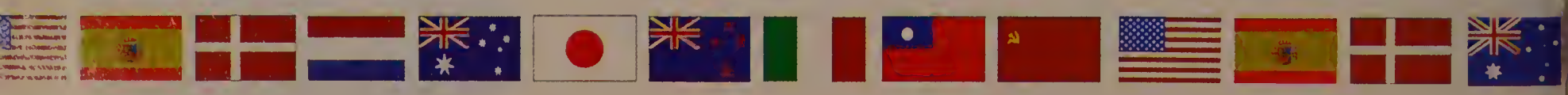

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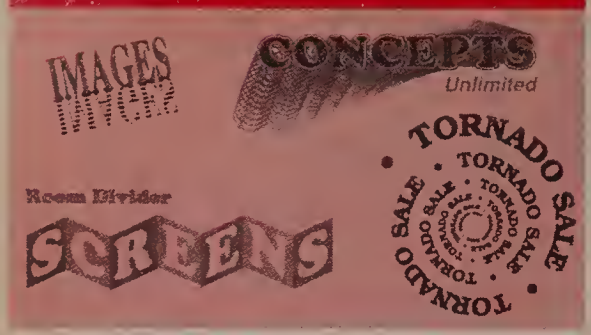

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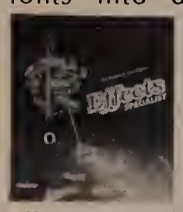

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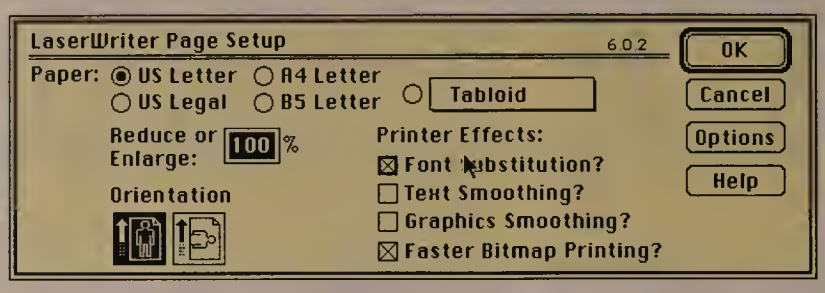

COMFORTABLE CLICKING Clicking the text next to a radio button or check box often has the same effect as clicking the button or box itself.

icons of all SCSI devices by using either of two Control Panel add-ons, SCSI Tools (also called SCSI) by Paul Mercer, or SCSI Probe by Robert Polic. Both are available from online information services such as America Online (files SCSI and SCSI Probe 2.03 in the Utilities section of the software library) and from many user groups.

Glenn R. Grafton
Telford, Pennsylvania

The F-key (function key) MountEm by Bill Steinberg also mounts all unmounted SCSI volumes. You can get it from CompuServe (file MOUNTM.SIT in Library 6 of the MacPro forum), other information services, and many user groups.

These tools are also handy if you have a removable hard drive, such as the popular 45MB Syquest mechanism sold under many brand names. Most of those drives require an INIT (start-up document) if you want to start up your system without a removable cartridge inserted and still be able to use a cartridge that you insert later. You don't need the INIT (the fewer INITs the better, I always say) if you use SCSI Tools (shareware), SCSI Probe, or MountEm (both freeware). Any of them will mount a removable cartridge inserted after start-up.—L.P.

Dust Devil

TIP: Fabric-softener sheets that have been through the clothes drier make good antistatic screen wipes. They keep dust off the screen longer than tissues do.

Bill Achuff
Philadelphia, Pennsylvania

Wide View

TIP: Here's a tip for avoiding the painfully slow screen redrawing that occurs when you horizontally scroll a Microsoft Word 4.0 table that's wider than your screen. After setting up the table's column headings, resize the document window so it fills the screen horizontally but only fills the top half of the screen vertically. Now use the New Window command (Window menu) to open another window on the document. Resize and position the new window so that it fills the bottom half of the screen below the original window. Use the horizontal scroll bar to shift the view in the new window so that you can see the right side of the table, which is out of view in the original window. Now you can work on the left side of the table in the upper window and the right side of the table in the lower window.

Ward Barnett
Minnetonka, Minnesota

Hitting the Button

TIP: I find that radio buttons and check boxes in dialog boxes seem to shrink in size as the day wears on. By the end of an overly hectic day, hitting those tiny targets seems too demanding a task. Give yourself a break, and aim at the larger target—the text that labels the button or box (see "Comfortable Clicking"). This method has a small but meaningful bonus: Clicking the text lets you see the status of the button or box without moving the pointer.

David J. Vess
Rowland Heights, California

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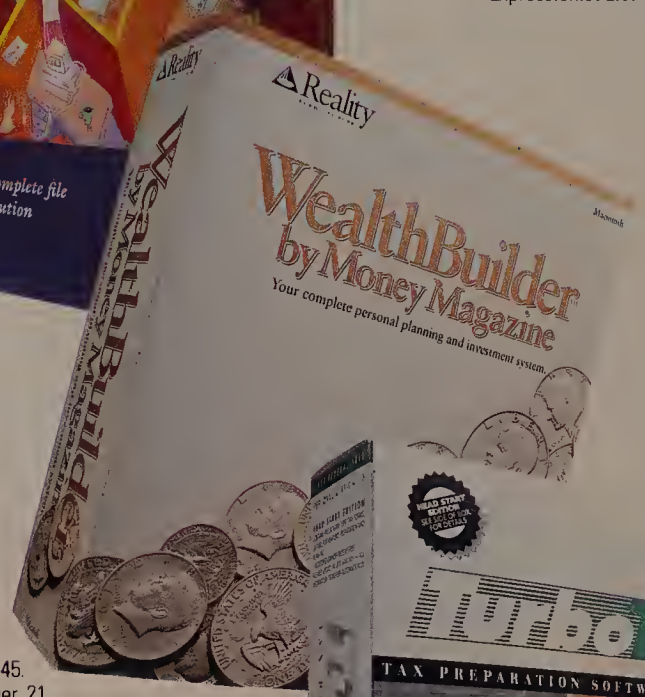

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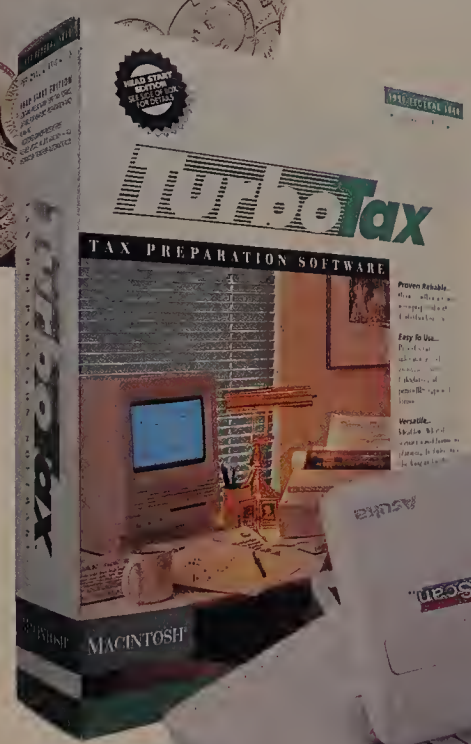

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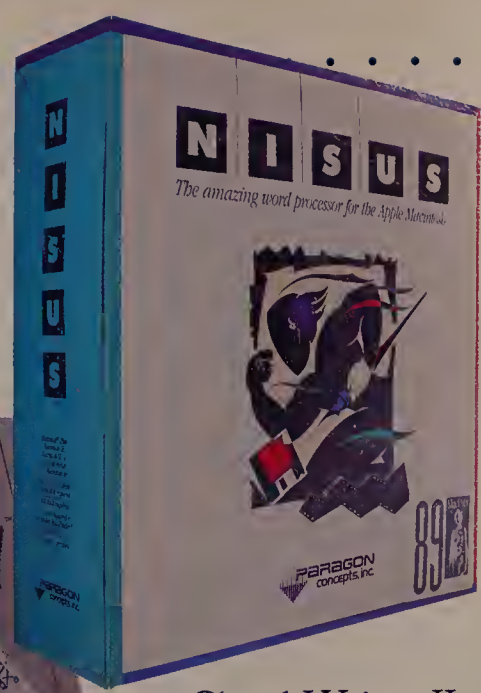

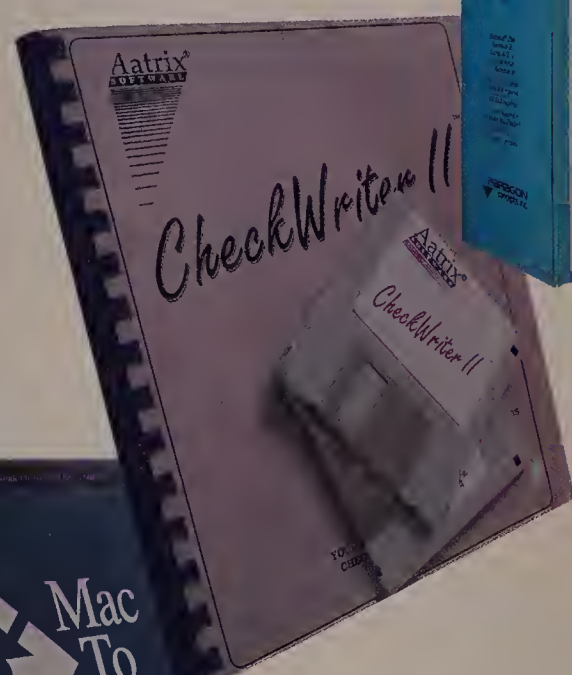

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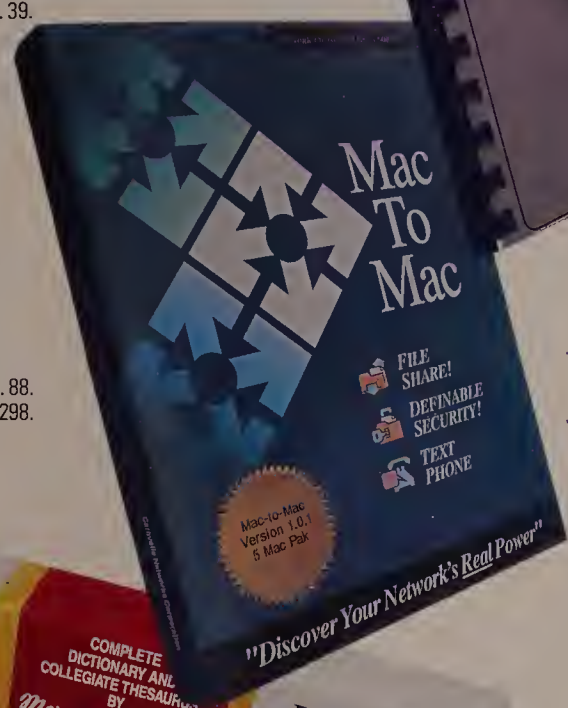

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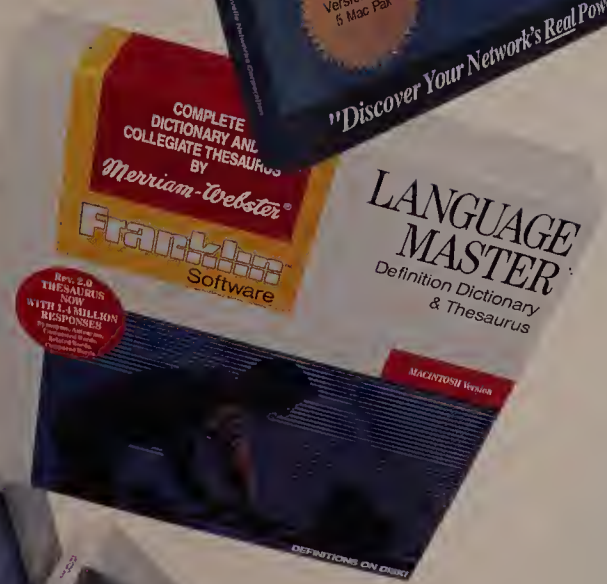

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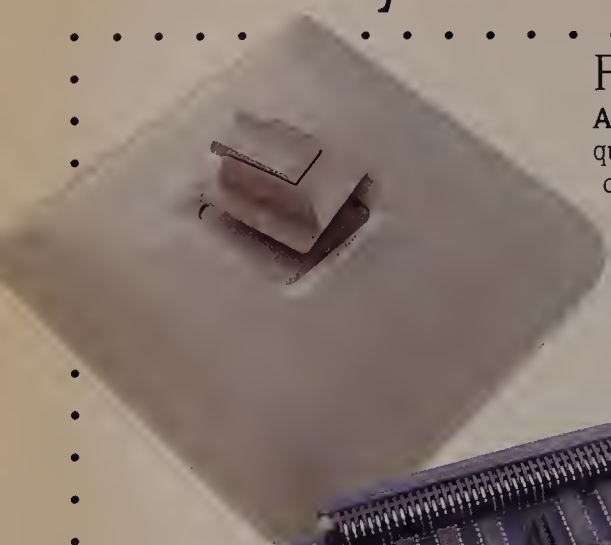
"International orders? Oui! ¡Si! Ja!.Dah!" –Mac

"Use your fax machine –fax us your PO."—Mac



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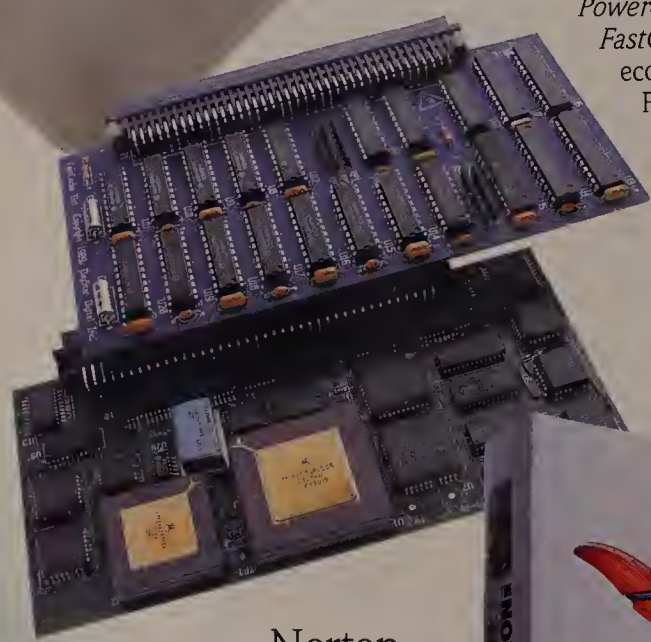

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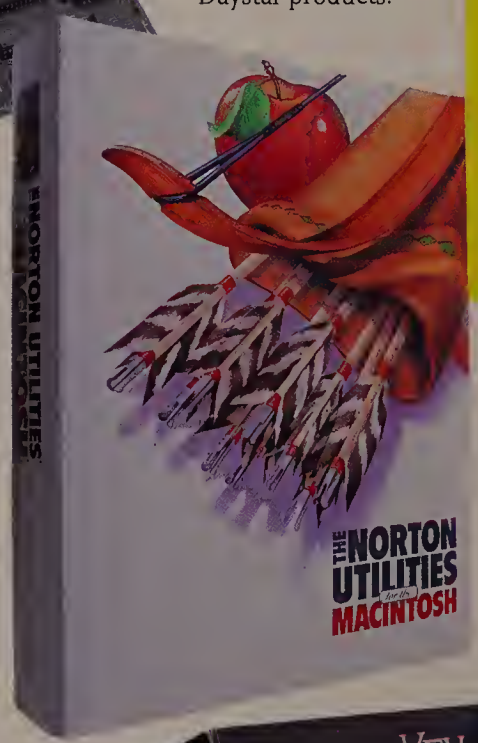

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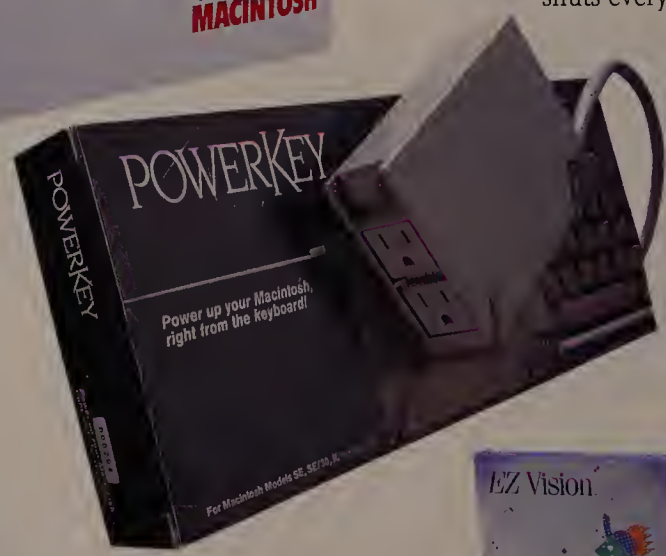

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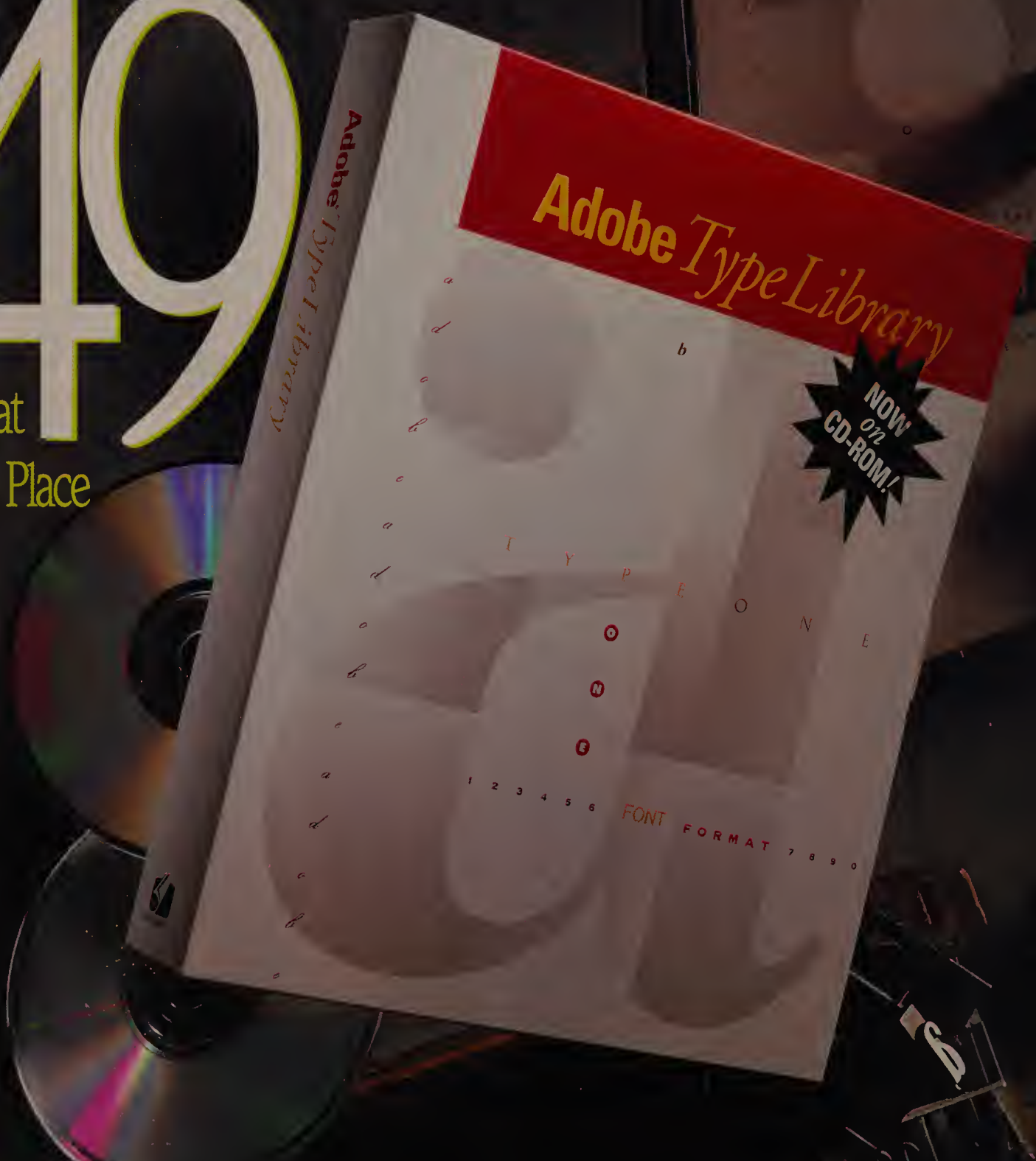

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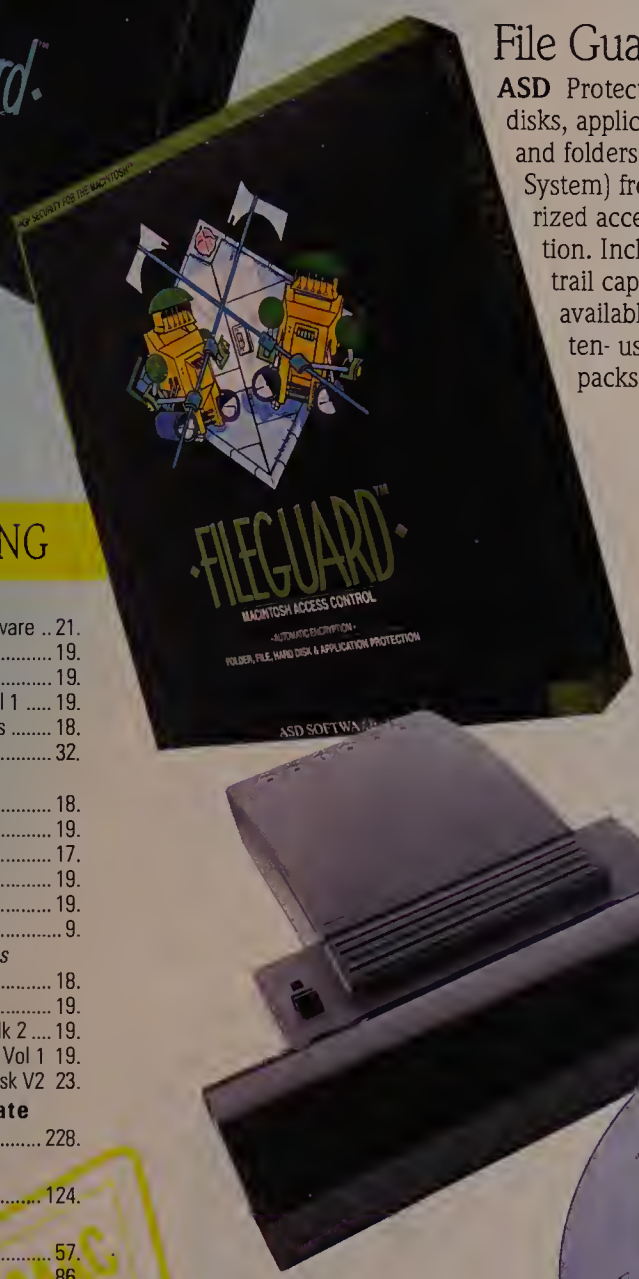

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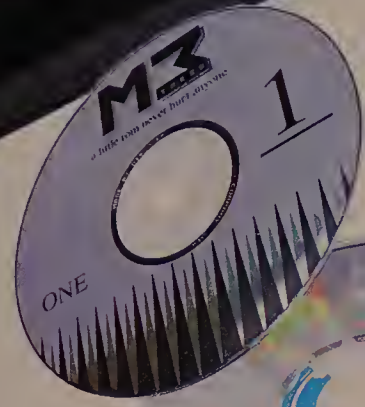

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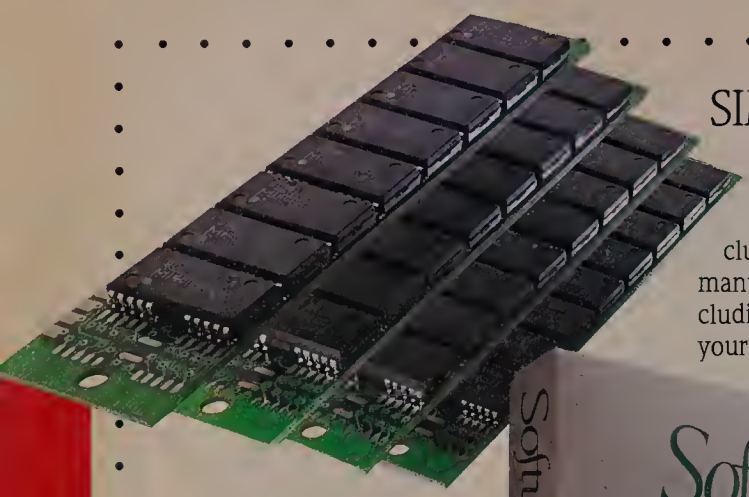

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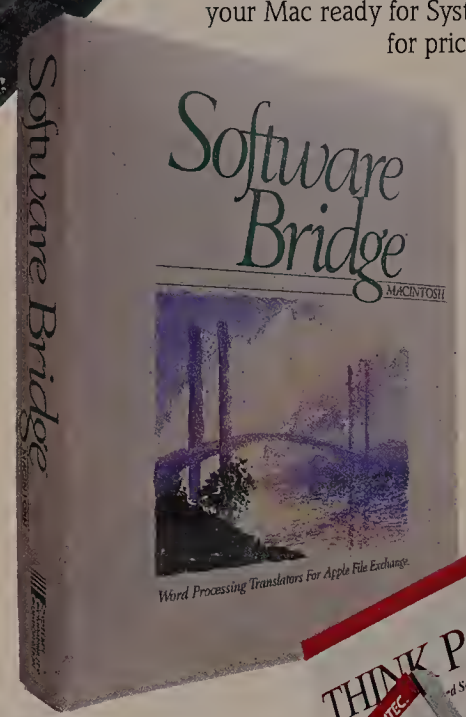

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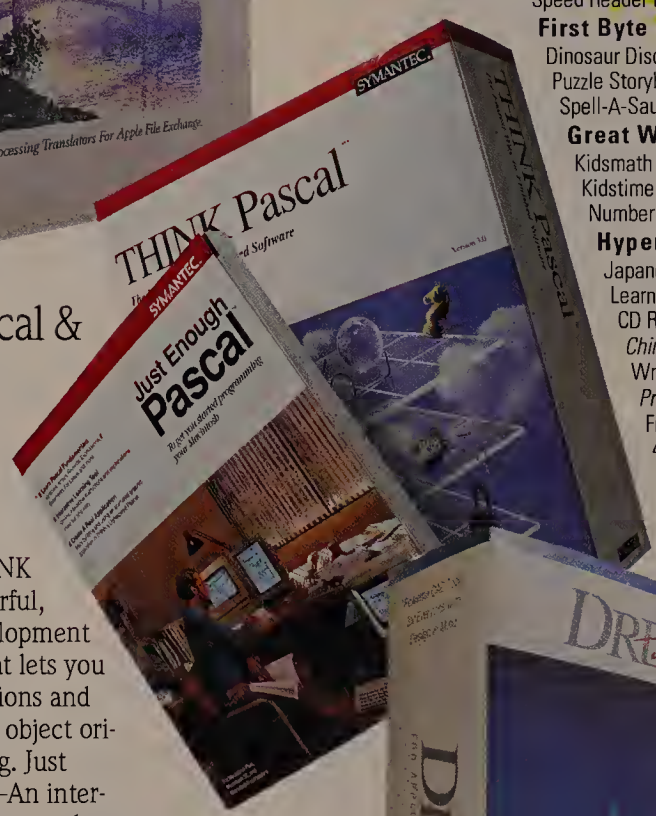

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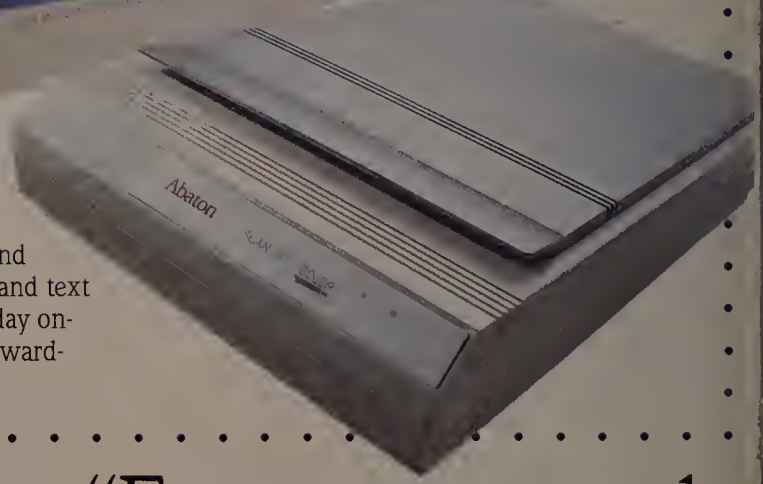

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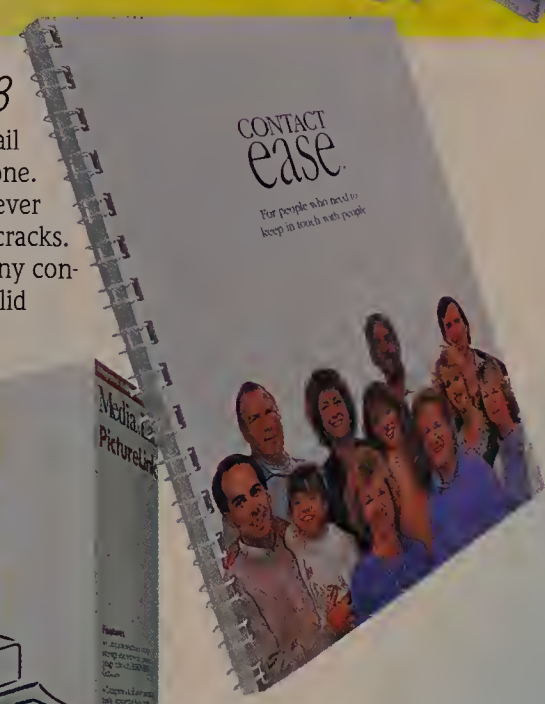

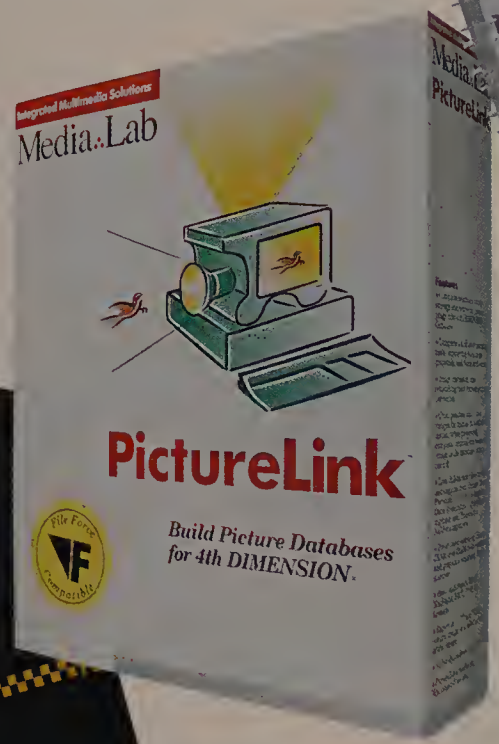

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HOW TO

Getting Started with Project Management

REACHING YOUR GOALS ISN'T ALWAYS EASY. PM SOFTWARE CAN HELP.

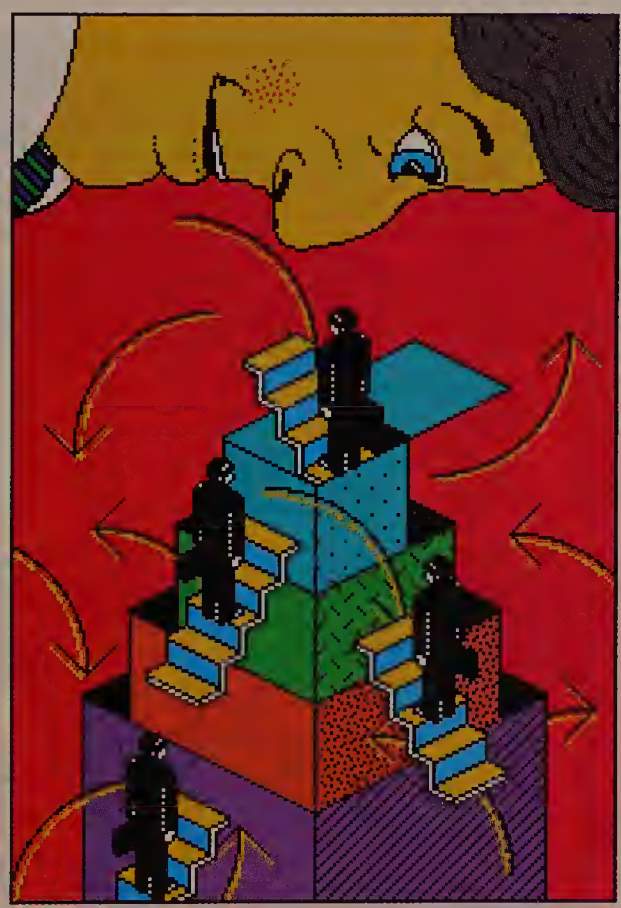
BY JIM HEID

Business life is full of goals, and each one breaks down into milestones that must be performed in sequence. Want to build a building? First you need to buy land, get permits, and draw plans. Introducing a new product? You need to build a manufacturing line, design packaging, and develop a marketing plan.

Each milestone in a project often breaks down into steps of its own. You can't buy land until you've met with real estate agents. You can't design packaging until you've hired a designer. Fleshing out all the steps involved in meeting a goal is like opening one box and finding another—and another, and another.

Project-management programs—or *project managers*—are designed to help you keep track of all those boxes, called *tasks*. Project managers can also help you allocate a project's *resources*, such as the people who will perform the tasks. And most important, project managers let you superimpose this cast of characters on a calendar to help you make sure things happen when they're supposed to.

The promise of project-management software is appealing: type in lists of tasks, resources, and dates, and out come fancy charts that graphically depict a project's steps and schedule. Consequently, you can't help but meet a goal on time and within budget.



MARK ULRICH

And if you believe that, there's a big bridge in Brooklyn I'm taking offers on. Project management is one area where the old computer maxim, "garbage in, garbage out" applies in spades. Charts and graphs won't help you meet a goal if the dates and data you supply are incomplete or unrealistic. What's more, project-management programs impose a kind of rigid order on projects that you might find too restrictive or just too much trouble. They're specialized programs: not for everyone, but priceless for some—and required by most government agencies and subcontractors.

How They Work

A project-management program is part database manager, part spreadsheet, and part graphics program. Like a data manager, a project-management program lets you store and retrieve data—the tasks that make up a project, the time they'll take, the names of the people or companies who will perform them, the costs of materials and labor.

Like a spreadsheet program, even the most basic project-management software lets you perform *"what-if" analysis* by plugging in different numbers to see their impact on the bottom line. After specifying relationships between the data you enter, you can then ask "what-if" questions by entering new values and examining their effect on the project's schedule. What if it takes

(continues)

two weeks instead of one to get permits? What if we hire only five carpenters instead of eight? What if costs increase by 10 percent? These are questions many planners ask themselves frantically in the middle of the night; unlike a ceiling, a project manager can provide some answers. And if none of the scenarios you've set up seem to work, you can always revert to your saved project document to restore the original numbers.

Like a graphics program, a project manager can take all the numbers you supply and generate charts that depict a project's schedule, cash flow, and resource allocation. You can see at a glance whether you're on budget or whether you've assigned too much work or too little to a particular person or group.

Using a project manager involves specifying three kinds of information: a project's tasks, the amount of time each task will take, and the resources required to perform them. You can then create, distribute, and study the resulting charts and graphs to make sure your assumptions are realistic and to make adjustments where needed. After the project is under way, you revise the data to accommodate unexpected delays or changes in the project or your resources.

A Juggler's Assistant

A project-management program's real strength isn't generating pretty graphs and schedules; it's showing the options for meeting your goals and helping you juggle the trade-offs that must often be made between a project's tasks, your resources, and the time allotted to the project. To meet a goal, do you add resources (more employees, more money, longer work hours)? Do you delay the completion date or start earlier? Or do you simplify the project by scaling down your plans?

As the following scenarios show, the project itself often dictates which trade-off is the most viable.

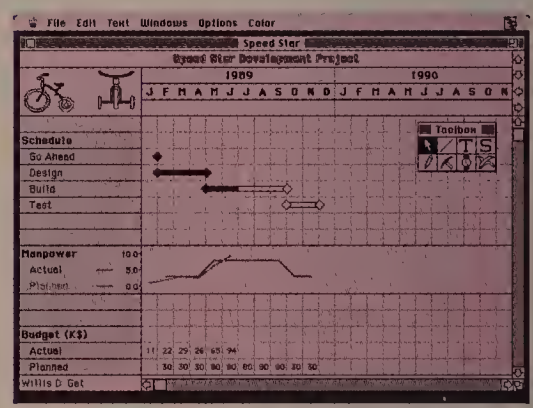
- A business planning an exhibit at a trade show is dealing with a time-constrained project, since the show's starting date can't be changed. The manager in charge of the exhibit plugs in the starting date of the show, and then specifies the tasks behind the goal—designing, building, and shipping the booth; making travel and lodging arrangements; printing brochures; and setting up the booth. Resources in such a project include the company building the booth, the printing company, the brochure's designers and copywriters, and the budget. After meeting with representatives of each group to determine how long its job will take, the manager uses the project-management program to work backward and determine the best date for starting the project, adjusting resources and/or the scope of the project (perhaps choosing a simpler booth design) as needed to ensure that everything is ready for opening day. In project-management parlance, this type of project presents a *backward-scheduling* challenge.
- A contractor is building a house and facing strict budget constraints—the buyers can afford only so much, and they're approaching that figure fast. The contractor meets with them to determine which amenities they're willing to forgo; he then removes the associated tasks from the project's model until its cash-flow figures agree with the buyers' budget. This is a *cost-constrained* project.
- An electronics manufacturer is planning to unveil a new gizmo at the next major trade show, but the date is looming and the product isn't ready. The development team managers can't scale down the project or delay the launch date, so they meet with the product's engineers to find out which tasks are causing the delay. Then they use a project-management program to determine how many additional engineers will be required to complete the *critical* tasks on time.

There's a common denominator in each of these scenarios: before turning to the project-management program, the project leader must first prioritize the project's budget, timeline, and scope—by heading into the trenches to meet with the people who will be performing or paying for the work. A good project leader performs this vital step before the project is under way and then uses the project-management software to spot problems before they arise.

Managing the Jargon

The project-management world has its own jargon, most of which sounds like the rantings of a business school graduate who's had a bit too much caffeine. Project management has indeed been embraced by many MBA types, but much of its terminology was created decades ago by that greatest of jargon generators, the government. Indeed, government, construction, and highly technical manufacturing industries are today's largest users of project-management software.

Many project-management techniques were developed to manage shipbuilding efforts during World War I, when Henry Laurence Gantt devised a kind of bar chart that illustrates a project's tasks and timelines. All popular project-management programs can create these *Gantt charts* (see "Tasks and Timelines").



TASKS AND TIMELINES Gantt charts, such as this one created by Mainstay's MacSchedule, display a project's schedule as a bar chart. The shaded portion of each bar represents that task's *slack time*, within which the task's start date could slip without delaying the project's completion date. Below the chart are the results of some of MacSchedule's basic resource-analysis features.

In the 1950s, Du Pont and Remington Rand developed the *critical path method*, or *CPM*, project-management technique, which isolates the tasks that directly affect other tasks and ultimately the finish date of the entire project. In a construction job, for example, a delay in obtaining permits will delay the start of construction. The critical path is project management's game of dominoes—delay one task on the path, and those that follow are delayed, too.

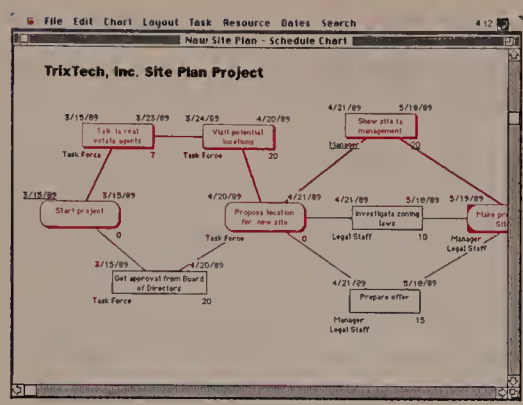
The U.S. Navy incorporated CPM into its *program evaluation and re-*

view technique, or *PERT,* created to manage the development of the *Polaris* nuclear submarine. *PERT charts* graphically display a project's steps by placing each task within a box and using lines to interconnect related tasks. The critical path is usually highlighted using bold lines (see "Treading the Critical Path").

Some related tasks are known as *dependent tasks,* which means their completion is dependent on that of other tasks. For example, the task "eat dinner" is a dependent task of "cook dinner." In most project-management programs, you indicate these *dependency relationships* by drawing lines between the task boxes. The entire arrangement of tasks and their interconnecting lines forms a *dependency network.* Since only a PERT chart can visibly display dependency relationships, that's the format preferred by project managers.

Clock Watching

When specifying a task in project-management software, you supply several time-oriented pieces of information that the program uses to calculate schedules and workloads. One such tidbit is a *duration* value, which tells the program how long that task will take. It's important to supply accurate duration values, since the program uses them to calculate many aspects of the project's schedule. You might also specify *lag times,* which are delays between tasks. A contractor might specify a two-day lag time between the tasks "pour foundation" and "erect walls" in order to allow the concrete to set.



TREADING THE CRITICAL PATH In a PERT chart, the critical path is denoted by bold lines. Rectangles represent tasks; each round-cornered rectangle represents a *milestone,* a goal or significant point in the project. Claris's MacProject II is shown here.

And you might specify an *earliest start date,* the earliest date on which work on that task can begin. Generally, you specify an earliest start date for the first task in a project and let the program calculate the earliest start dates for remaining tasks based on the duration and lag-time values you supply. You can, however, specify explicit earliest start dates for tasks that are midway through the project—if, for example, a given resource won't be available until a specific date.

For these time calculations, you can specify durations, lag times, and the like in any time interval that's appropriate for your project, from hours to days to weeks to months. To let you be even more specific, project-management programs also allow you to define *resource calendars* that describe when a particular resource is available. For example, certain engineers may be available only on Mondays, Wednesdays, and Fridays. Or your overseas team may work six

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PROJECT-MANAGEMENT TIPS

Effective project management doesn't come from Gantt and PERT charts, but from careful planning and experience. Here are some insights gleaned from Peggy J. Day's book of tips called *Getting Organized with MacProject II* and from the excellent manual that accompanies MacProject II.

▪ *Specify a goal* Write a charter describing the project's exact purpose. Don't be ambiguous. For example, the goal "build a better mousetrap" might mean "build a trap that kills mice more effectively" or "build a trap that costs less to manufacture." Distribute the resulting charter to team members so that everyone knows your objective. Revise the charter as needed when plans or goals change.

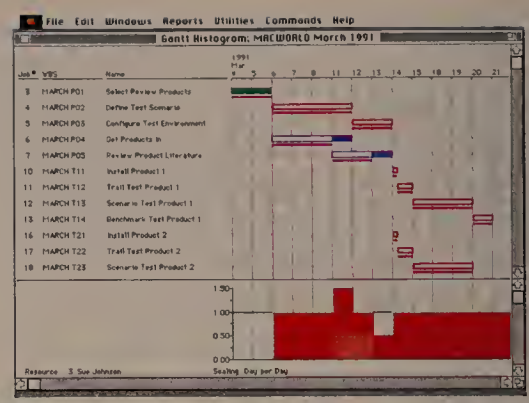
▪ *Determine phases and tasks* Break the project into phases—planning, design, implementation, testing, and so on—and then break each phase into its tasks. Make each task as small and specific as possible; this enables you to provide more precise resource and duration information. Jot down the phases and tasks in outline form; to do this you could use KeyPlan's outline view, Symmetry's Acta desk accessory, or the outlining feature within a word processor.

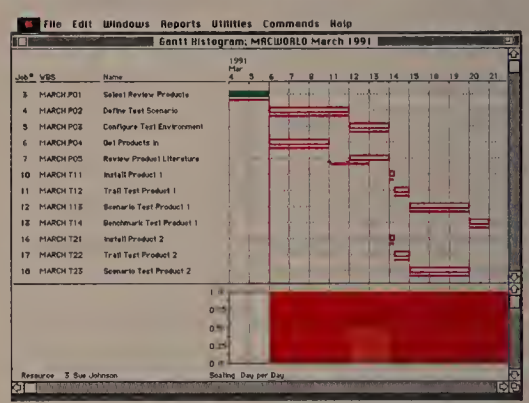
▪ *Use history when planning* You know the old saw: Those who ignore history are doomed to repeat it. Consult company records from previous similar projects; problems that surfaced then may well surface again. Remember to adjust for inflation and any changes in company procedures.

▪ *Allow time for the unexpected* Build extra time into the schedule, and add slack time following tasks you don't have direct control over, such as the delivery of a key part by an outside vendor. It's easier to figure in slack time before a project begins than to make up for lost time later. Have contingency plans that you can invoke if the worst happens. Start with the critical path, since that's where you're most vulnerable.

▪ *Update project records often* When schedules, resources, or costs change, update the project model so it's up-to-date. Too often, a project begins with a sharply defined schedule that dissolves into chaos as the project progresses and the real world intrudes. Keep the project model current, and you'll increase your chances of staying on track and within budget. Be sure to distribute current versions to everyone involved.

▪ *Meet early and often* Before plugging in duration dates for tasks, meet with the people who will be performing the tasks and solicit their input. When the project is under way, schedule regular meetings to make sure that things are on track. Document unanswered or unresolved issues to create a list of action items that describes who's responsible for resolving each item. If a task slips, inform the appropriate higher-ups before someone else beats you to it. Peggy J. Day says it best: communicate, communicate, communicate.





ARE WE OVERWORKED YET? Project Scheduler 4's resource-leveling features in action. In the first screen, the resource histogram shows that Sue Johnson is overallocated on March 11 and underallocated on March 13—by 50 percent. In the Gantt chart, the dark blue shading represents one day of *free-float* time—a period within which the task could be delayed without affecting other tasks. The light blue shading represents *total-float* time, which would delay subsequent tasks but not the project's completion. In the second screen, the triangle shows a one-day delay for starting Review Product Literature, using up the free-float time. The pink baseline represents the original schedule. The revised histogram shows that Sue Johnson is no longer over- or underallocated. The pink rectangle indicates that 50 percent of Sue Johnson's time is allocated to Review Product Literature.

days a week while the local team works only five. Creating separate calendars for such resources makes the dates calculated by the project-management program more accurate.

To help you keep track of the demands made of a particular resource at a particular time, most project-management programs let you create *resource histograms*. These charts are useful when you've assigned a group of people many different tasks because they make it possible to see at a glance whether or not you've given them too much work to complete in a given amount of time. For example, if you've assigned a variety of tasks to a group of engineers, you could create a resource histogram that would show whether *x* number of engineers could perform those tasks within the timeframe allotted to them (see "Are We Overworked Yet?").

When the histogram indicates that you've overloaded a particular resource, you might invoke the *resource leveling* options that you'll find in Claris's MacProject II, Scitor's Project Scheduler 4, Welcom Software Technology's Open Plan/Mac, and Micro Planning International's Micro Planner series. A resource leveler first scans a project chronologically and locates over-allocated resources. An *automatic* resource leveler then reschedules tasks and juggles resources to resolve the over-allocation. An *interactive* resource leveler queries you along the way, allowing you to pick and choose which tasks and resources to juggle. Many project planners prefer interactive leveling because it leaves the decision making up to them, rather than the program. The aforementioned programs provide both leveling options.

A Project-Manager Sampler

Before personal computers became powerful enough to handle all the data and calculations involved in project management, project planners often calculated dates and costs by hand or with mainframe computers, and then hand-drew—and endlessly revised—blueprint-size charts. (Some masochists still work this way.) The Mac family has not only enough processing punch to handle the complex calculations required by project management, but the text and graphics skills needed to create all those charts and graphs as well as the detailed reports that more sophisticated programs can produce.

At the low end of the project-management spectrum, you find Gantt chart–generating programs such as Mainstay's MacSchedule and MacSchedule Plus, AEC Software's (formerly AEC Management Systems) FastTrack Schedule, and Varcon Systems' Great Gantt. These aren't project-management programs as such; they lack the ability to track dependencies and analyze relationships between tasks and resources. (MacSchedule Plus does provide several cash-flow analysis features.) They're most effective for someone who wants help in developing schedules and wants to create Gantt charts for presentations and reports, without getting mired in project-management jargon and concepts.

At the next level—a big step up from these programs—you'll find (in order of sophistication) Symmetry Software Corporation's KeyPlan, Claris's MacProject II, and Micro Planning's Micro Planner. KeyPlan provides such project-management essentials as PERT charts and multiple resource-calendars, and wraps them around an easy-to-use interface that features a text-oriented outliner similar to Symmetry's Acta Advantage. It can also read outlines created with Acta and Symantec's More.

MacProject II, the most popular Mac project manager, has all these features plus resource leveling, a larger variety of reporting options, and support for *subprojects*. A subproject is a project within a project, stored as a separate document and opened when you double-click on the subproject's box. A complex project—the design of a new airplane, for example—is more easily managed when broken into a number of smaller subprojects.

MacProject II also has an excellent manual that teaches project-management basics as well as the program itself. Claris offers a $25 trial package, which includes a demonstration version of the software, a videotape tutorial, and a workbook. It's a great way for a beginner to sample the murky waters of project management. Claris also offers corporate training courses for MacProject II.

Micro Planner offers more features than MacProject II, including a larger variety of reporting and searching options that let you focus on specific resources and tasks. But Micro Planner's interface is a bit tricky to learn, and the program uses a somewhat confusing project-diagramming format, the *activity on arrow* method, in which task descriptions appear

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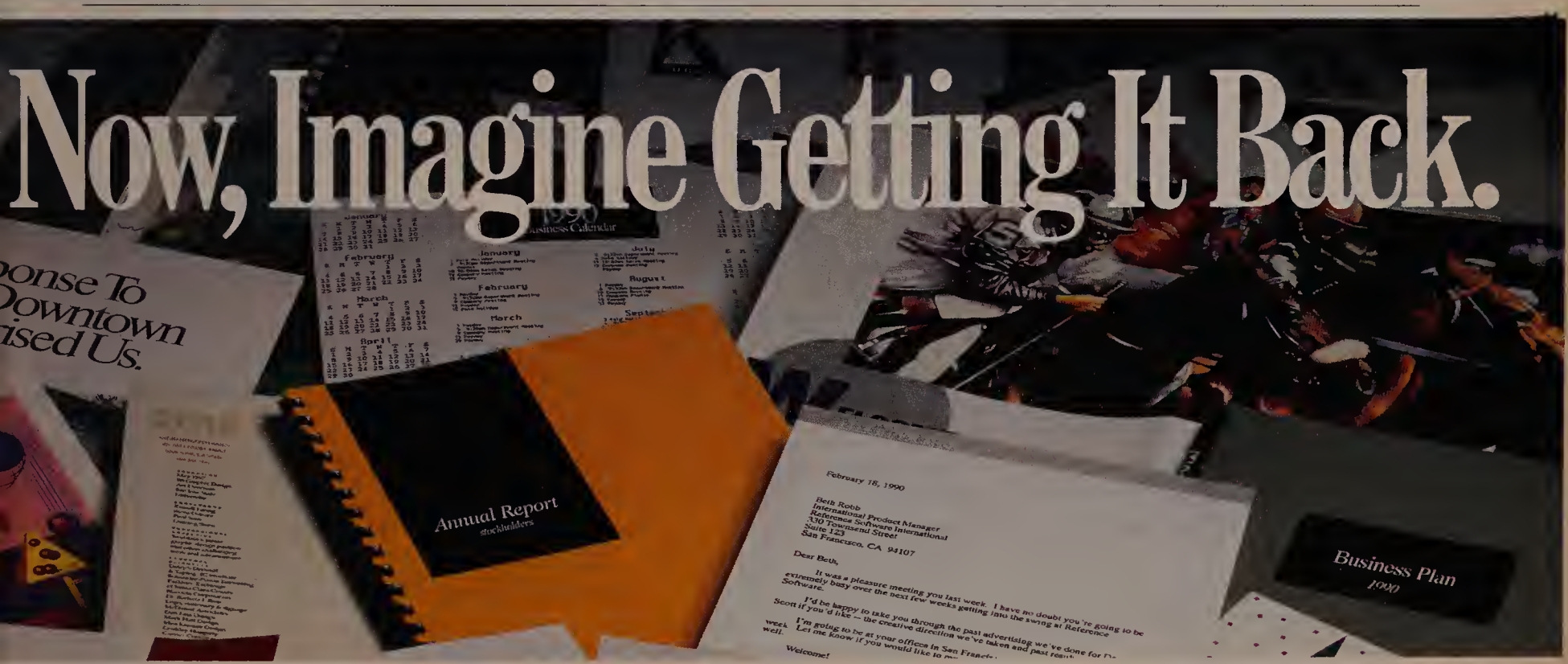

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alongside the arrows that interconnect tasks. (Most other programs use the *precedence diagramming* method, in which task descriptions appear within boxes.) Micro Planning International is working on a new version of the program that is expected to smooth out some of these rough edges.

At the high end are programs such as Scitor's Project Scheduler 4, Micro Planning International's Micro Planner X-Pert, and Welcom Software Technology's Open Plan/Mac. These programs range in price from $685 for Project Scheduler 4 to over $4000 for Open Plan/Mac. Their primary strengths? The ability to manage projects comprising thousands of tasks and to have multiple projects in memory simultaneously, more analytical features for fleshing out schedules and allocating resources, and the ability to apply those features across multiple projects. They can also produce more types of reports, allowing you to examine a project from more angles. The developers of these programs also offer training services.

But buying one project-management package doesn't preclude using another. Many programs can read files created by competing products, and all high-end project-management vendors offer customizing services that may include developing translation utilities. For example, Boeing recently commissioned Micro Planning International to create a utility for swapping data between Micro Planner X-Pert (which Boeing uses to manage development of its 777 jetliner) and Open Plan/Mac (which some of Boeing's subcontractors use). With these built-in or extra-cost data-transfer features, a company can use a variety of project-management programs, choosing midrange products such as MacProject II for managers who aren't project-management veterans, and kitchen-sink products such as Micro Planner X-Pert or Open Plan/Mac for the gurus in the corporation's project-management department.

In the end, you'll need to weigh a program's sophistication against your level of experience. If you're new to project management, you'll probably get better results from MacProject II or KeyPlan than from Micro Planner X-Pert or Project Scheduler 4. After all, a high-end project manager's extra features won't help you if you find the program too daunting to use in your day-to-day work.

Worth the Trouble?

I've spotlighted the key concepts behind project management, but the discipline is too complex to be covered in detail here. If you are interested in learning more, I suggest a book called *Getting Organized with MacProject II* (Van Nostrand Reinhold, 1990). Written by Peggy J. Day, a project-management consultant and educator in Portland, Oregon, it describes project-management concepts in detail and provides good advice for what to do before you start up your project-management program. I've included some of her insights in "Project-Management Tips."

Can project-management software help you? That depends. Some projects don't break down into tidy tasks as neatly as others. In many organizations, goals are redefined and resources are reassigned on the fly in order to meet urgent needs or respond to the competition. Project-management software doesn't handle this on-the-fly managing style well; it thrives on order and structure. On the flip side, a project model that's kept current can project the results—in time and costs—of an on-the-fly decision, which is often a sobering experience for its proponents. As Peggy J. Day says, "Nothing grounds a knee-jerk decision faster than a project-management program." Alas, many managers are so bogged down by their daily duties that they don't have time to keep the project model up-to-date as the project progresses.

In the project-management world, as in business, the object of the game is to meet your goals. Whether a computer program can help you do that is something only you can decide. ■

See *Where to Buy* for contact information.

Contributing editor Jim Heid focuses on a different aspect of Mac fundamentals each month. He is currently working on a complete guide to the Macintosh, to be published this year by IDG Books Worldwide.

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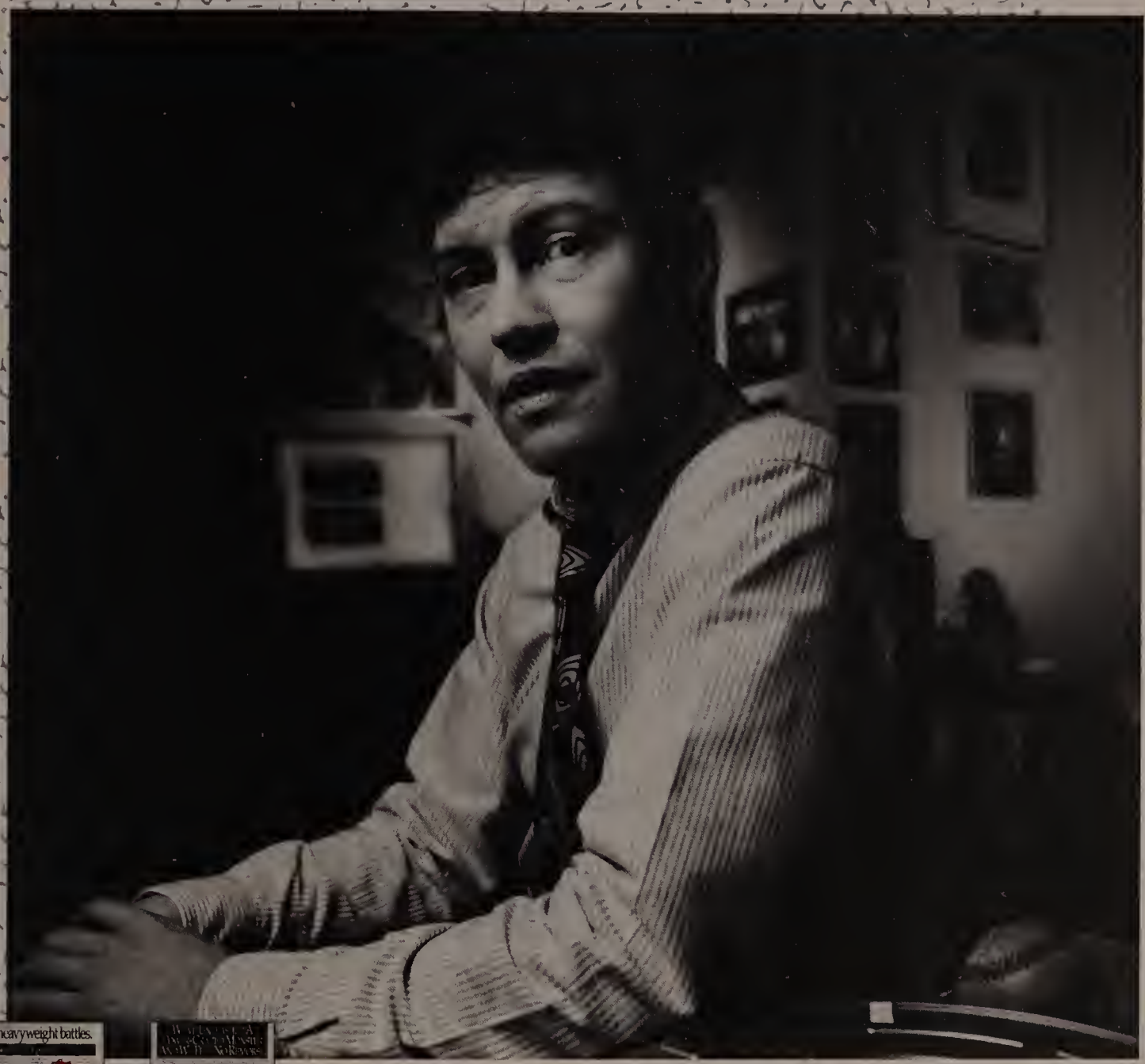

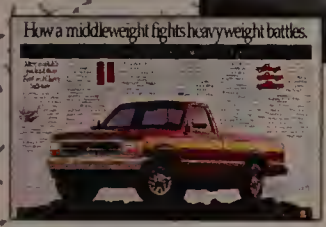

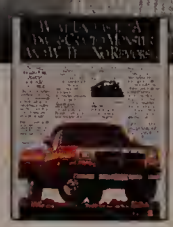

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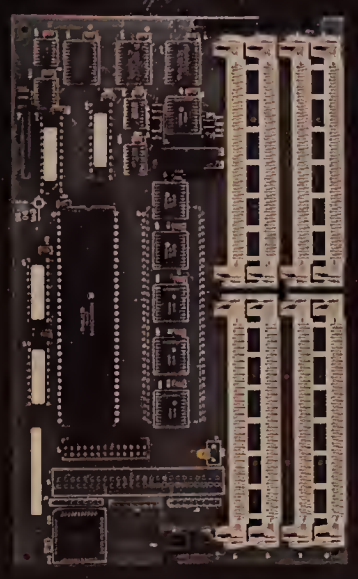

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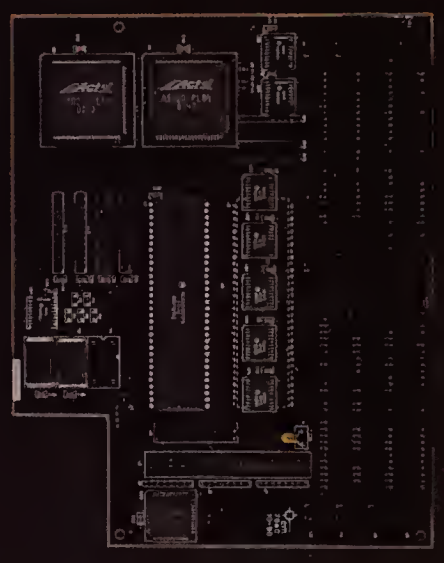

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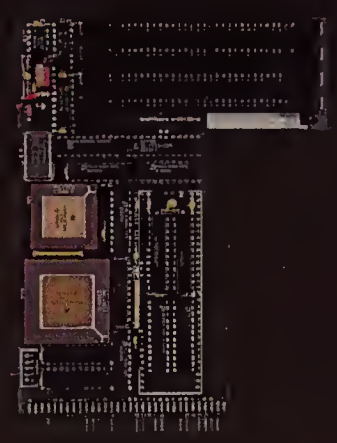

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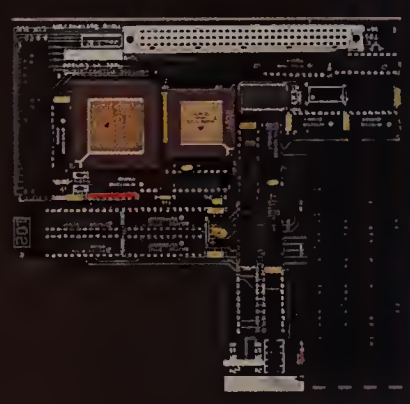

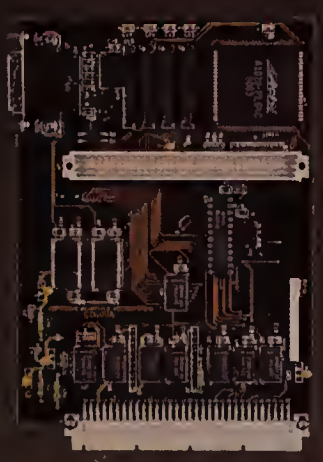

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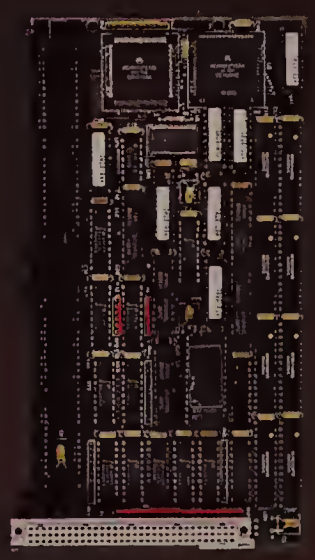

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Insights on FileMaker Pro

Tips to help you to be a pro

BY CHARLES SEITER

FileMaker is currently the best-selling Macintosh database, and it's easy to see why this should be so. FileMaker is easy to learn, especially strong on designing forms for data entry and output, competent at a variety of relational tasks (although, strictly speaking, it's a flat-file database), and unobtrusively networkable.

With FileMaker Pro, Claris attempts to introduce a new level of programmability, so that FileMaker developers can produce slick applications for vertical or business markets. For the nondeveloper, buttons help streamline the program's operation; structuring databases has been made more flexible; and pop-up menus, radio buttons, and check boxes make data entry easier. If you use FileMaker, you owe it to yourself to try some of the fancy new features.

Thanks to Claris's Dennis Marshall, FileMaker product manager, and Bill Marriott, FileMaker Pro technical lead, for advice and comments.

SCOTT BALDWIN

Safely Converting from II to Pro

Some people have problems converting old FileMaker II documents to FileMaker Pro. To convert a file safely, try the following procedure. It sounds roundabout, but it's better than entering all that data again.

Use the Save a Copy command in FileMaker II to backup the database, being sure to select the Save as a Compressed File option. This not only makes a compressed version of the records, it also runs some checks for file damage and screens files for a variety of mystery bugs that never bothered FileMaker II but that cause Pro to crash unaccountably. If you have a problem, you're better off finding out about it in FileMaker II before you make the conversion. If the file gives you any trouble, try cleaning it up with FileMaker II's Recover command before converting. If you try to open a damaged file in FileMaker Pro, the program wrecks the old version and fails to produce a usable Pro file (a truly melancholic experience).

Now, open the compressed copy of the FileMaker II database from within FileMaker Pro using the Open dialog box. If you simply double-click on a FileMaker II file, the Finder goes looking for the II version of the program. (You can get around this if you use the utility HandOff II from HandOff Corporation). You can convert a batch of as many as 16 files by Shift-clicking on a set of II files and on the icon for Pro (all of these files must be in the same folder), then select Open from the Finder file menu. This method makes sense only if you have enough memory to accommodate all those files at once. One caveat: the conversion is one-way. You will never be able to run the converted files under FileMaker II, another good argument for making backup copies.

Here are a few conversion troubleshooting tips. If a file crashes during conversion, try opening it with

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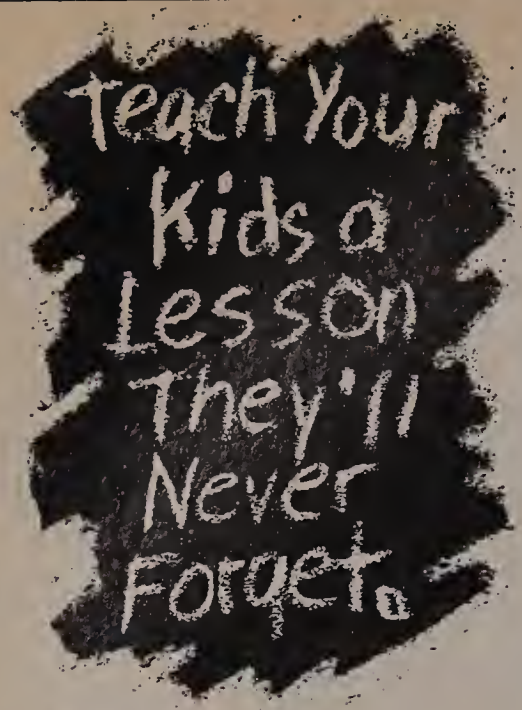

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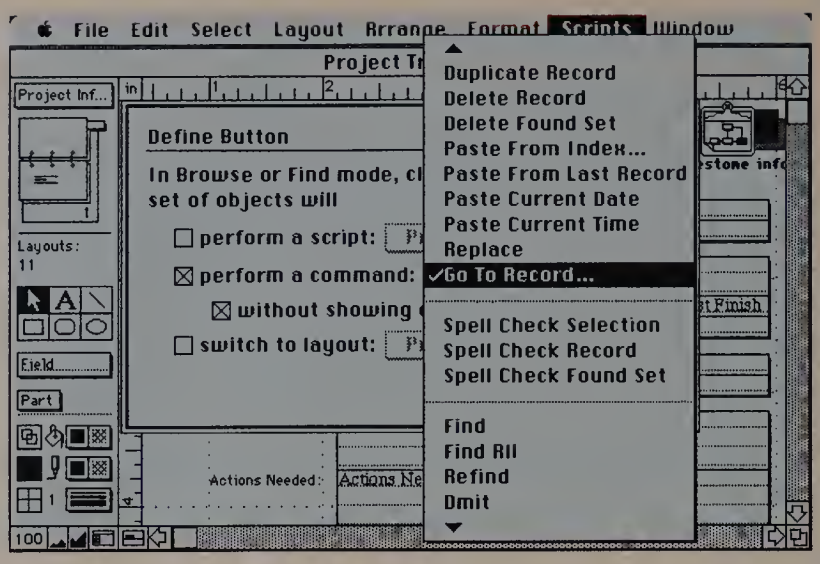


SCROLLING YOUR OWN There's not much to defining buttons. This screen shows part of the scrolling list of commands available for automatic assignment to a button you define. It's almost the simplest cognitive activity that can be classified as programming.

the Recover command in FileMaker II. (You may need to use a program like DiskTop to change the file type to FMK$.) If this fails, try using the Recover command in FileMaker Pro.

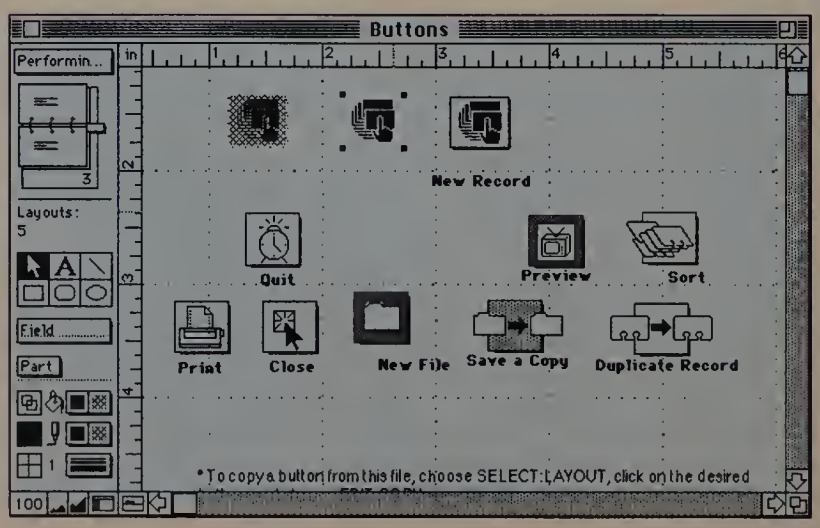
If the file opens in FileMaker Pro but still causes problems, try browsing the file and deleting damaged records that may be causing the problem. If the application crashes when paging to a certain record, create a new layout with no fields and make it the current layout. Switch to Browse, go to the problem record, and delete it. If the program crashes when you execute a particular script, delete that script. In severe cases, you may have to delete all scripts and reenter them in Pro.

If a Clone (empty file) crashes when you try to enter data, try exporting the information to a text file and then rebuilding the field definitions from scratch.

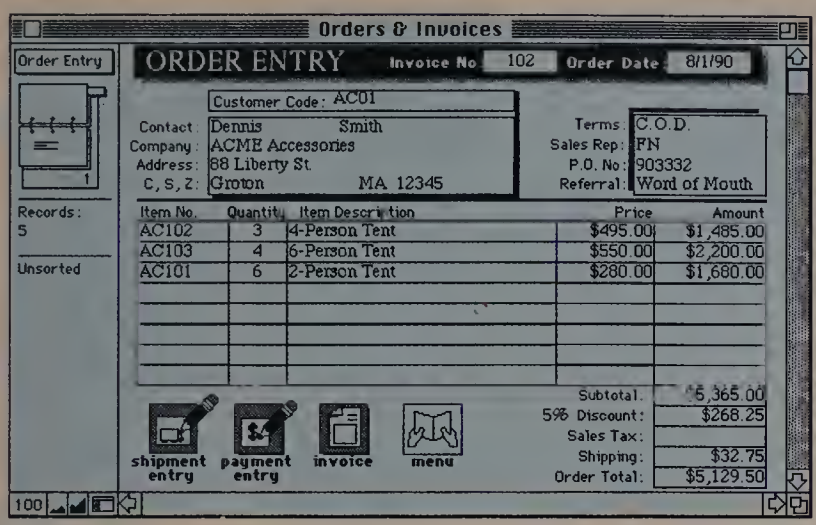
Invisible Buttons for Extra Space

Claris has added optional, customizable buttons to FileMaker Pro so that individual users can add the convenience features they want without burdening other users with them. For example, FileMaker Pro provides no Go to First and Go to Last buttons for navigating a database. But you can easily add your own. Create a button and define it to use the command Go to Record and enter 1 for the record ID, then check the option "without showing dialog" in the button-definition screen; create another button for the record 99,999 (or other suitably large number) to find the last one (see "Scrolling Your Own"). The buttons are now ready for use.

You may often want to include additional information about an item in a field (an explanation of the field's content, for example), but aesthetics prevent you from cramming all this information in a single layout containing the item. The way around this is to make a field act as a button, using the invisible-button trick. To do this you define a button with two characteristics: first, make the action of the button switch to a different layout, one that you've designed with more fields containing information pertinent to the item of interest; second, make the button transparent by giving it the same color and border as the background of the field (usually white). To



BUTTON CARD The three examples of New Record button show variations in styling (if I made the example button invisible, though, you couldn't see it).



3-D DATA If you use the invisible-buttons trick, you may want to tag the fields carrying these buttons in some obvious way. Just pull out shading bars using line drawing in the Layout palette—shading a field box on two adjacent sides simulates a 3-D standout.

make a button transparent, you define the button under Layout, then select the intertwined squares for both fill pattern and line pattern (see "Button Card"). Position the invisible button over a field or fields in the original layout (it is a good idea to place it over the field name rather than the text portion of the field). Then when you click on the field the button is activated and switches to the new layout—the field itself acts like a button—and displays the extra information. Although FileMaker Pro allows you to extend and customize the help system, you may find that simply providing an alternate layout full of text provides sufficient explanation of your records and fields.

You might want a consistent highlighting scheme for identifying fields containing invisible buttons. One way to do this is with pseudo 3-D highlighting. Simply draw white or light-colored lines on the bottom and right side of the field, and black or dark lines on the top and left (see "3-D Data").

81 Colors and Counting

FileMaker Pro's 81 colors are based on the standard system color look-up table, and the colors, even pastels, are solid, as opposed to being a percent of solid. If you want to achieve a wider range of tones, you can invoke patterns in conjunction with colors. Each of the 81 colors can be used to replace the black dots in a pattern, giving a larger variety of paler shades.

Seeing Fonts on the Menu

FileMaker normally presents fonts in the font menu in their native typeface. If you are using a variety of symbolic fonts (Zapf Dingbats are the common example) for marking fields, you may want to see the font names instead. Just hold down the Option key when you pick Font from the Format menu. This works unless you are using Suitcase II, which overrides this trick.

Defining Fields, Again

In FileMaker II, once you place a field in a layout, you're basically stuck with the original field definition. FileMaker Pro gives you a second chance: pressing ⌘-Option and double-clicking on a field in a layout brings up the field-list dialog box, which lets you redefine the field with an existing definition, without changing the field's format. Another trick is to Option-click and drag on a field while moving it to another location in the layout; this maintains the field's original formatting. Additional tip: ⌘-clicking on a field gives it FileMaker Pro's default font and style settings.

You can also introduce an orderly numbering scheme into appropriate fields with a few clicks. In a layout view, pick Define Fields from the Select menu, find your field in the dialog box, and double-click on it. Another dialog box for specifying regular increments in the field appears (see "Count Down—or Up"). This specification is quite sophisticated. For example, if you create the part number FA-990, you can designate that the numerical part be held to three digits; this means the part number rolls up to FB-000 rather than FA-1000 as new records are added.

Working with a Net

FileMaker Pro slows down considerably in multiuser mode, so it's best to

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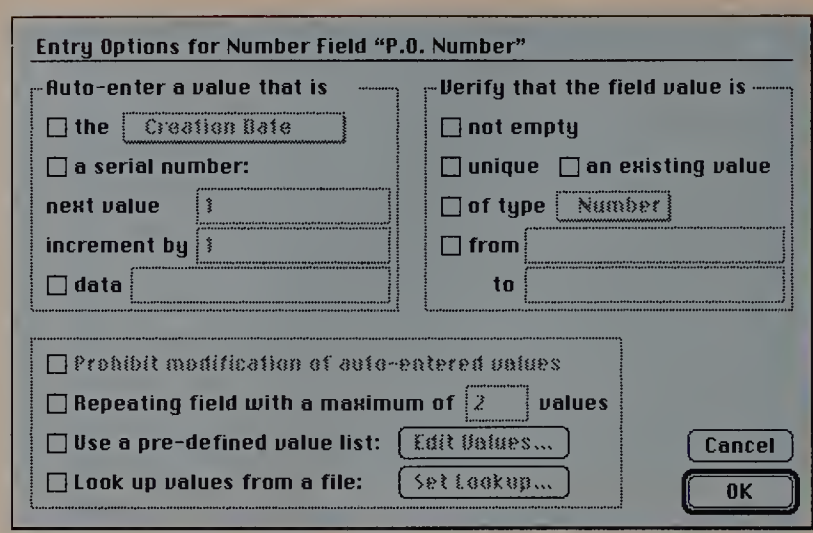
Circle 52 on reader service card

remove any inactive guests who are logged on to the network. FileMaker Pro posts a dialog box from the host machine to any inactive guests warning that if they fail to respond within a predetermined amount of time they will be logged off. (Host users are advised to produce suitably arresting warnings, so as to shock somnolent guests into action, rather than simply terminating the guests' sessions without warning.)

If you have a database file of your own but are operating on a network, you should know that the Exclusive flag in the File menu generally determines how fast your private database responds. If you forget to check Exclusive, the host runs through a host download/upload cycle every time you change a record. As you might expect, this is much slower than making the changes exclusively on your own Mac.

Printing Labels

To repeat a cliché from high school civics class, with freedom comes responsibility. The freedom to place graphic objects arbitrarily in a layout in FileMaker Pro (FileMaker II forced you to create objects left-to-right, top-to-bottom) means that you can, in exercising some cleverness, produce a layout that will give fits to the trusty ImageWriter you have consigned to a life of label printing. What happens is that the printer draws each object in the order it was created; if the objects weren't entered in "natural printer order," you get lots of rolling the platen back and forth, with attendant slipping and peeling-off of labels. If you have a layout with this problem, you can use the Arrange menu (Bring to Front, Bring Forward, Send to Back, Send Backwards) to override the creation order. Clicking on the Zoom box refreshes the screen and lets you see the results of your reorganization. If this sounds like lots of work (it is), remember that you can use FileMaker Pro's default label layout instead of using an arbitrary layout.



COUNT DOWN—OR UP The Entry Options dialog box gives you impressive flexibility in defining fields regularly numbered throughout sets of records. Double-click on a field in the list in the Define Fields dialog box to make this set of options appear.

Fine Arts

FileMaker Pro gives you the option of grouping several objects—say, fields of different sizes and graphics—to facilitate moving them around the layout; it's also handy for moving text and colored backdrops. The grouping feature, however, has some limitations. When you resize a grouped object, the component objects do not move the way they would in a graphics program like MacDraw II. The actual results can be unexpected. In general, you will get reasonable scaling when fields are contained within the group, but sometimes purely graphic elements get distorted.

Key Clash

Occasionally, the keyboard shortcuts —such as for switching between Browse and Layout, defining text styles, or formatting field options—fail with FileMaker Pro. This means you are running low on available memory. Since FileMaker Pro is bigger than FileMaker II, you run into problems on a 1MB Mac if you have many start-up documents (INITs) and Control Panel devices (cdevs). Your choices are to remove some INITs or cdevs, buy some SIMMs, or give up on the shortcuts.

If/Then Fix-Its

Often you want to do a calculation that checks for the presence or absence of data in a field and then makes a decision based on that test. Typically this situation calls for an If statement, as in if(taxflag = " ", "DoIt", "exempt"), which gives the value "DoIt" if the taxflag field is blank. The problem is that new records don't trigger this calculation until something is actively done with the field that you want to examine. Here's the quick fix to ensure that the calculation works the way you intend. Call up the Define Fields dialog box (under the Select menu) and click on the Options button to view the entry options for the field. Check the option to automatically enter data in the field, but use a space for the automatically entered value space. This forces FileMaker to enter a space in the field. Since FileMaker Pro interprets the insertion of a space as an action taken, the program executes the calculation correctly.

Sharing the Wealth

If you've found a tip or shortcut not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. M

See *Where to Buy* for contact information.

Charles Seiter has been using FileMaker since the old FileMaker Plus days. He was a beta-site tester for FileMaker Pro.

KEYBOARD SHORTCUTS

Here are some shortcuts that make working in FileMaker Pro easier. All of these are available from within the Define Fields dialog box. To get to the Define Fields dialog box, press Shift-⌘-D.

Calculation field	⌘-C
Date field	⌘-D
Number field	⌘-N
Picture field	⌘-P
Summary field	⌘-S
Text field	⌘-T
Time field	⌘-I

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- Save all correspondence, including your canceled check or money-order carbon and any written confirmation sent by the Seller.

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- Has the advertised price increased?
- What warranties does the merchandise carry? Who provides the service?
- What is the Seller's return policy? Exchange or repair? The refund policy?
- If a problem arises, with whom should you correspond?

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1. If you do not receive your order as promised or if the merchandise is defective, write to the Seller immediately. Include a description of your order, the price, date, and account number or order number if available. Keep a copy of your letter.
2. If you register your complaint by phone, send a follow-up letter to confirm and keep a copy of it.
3. If you think the merchandise is defective, review your product instructions and warranty carefully. Make sure you expect only those features and abilities that the product is supposed to have. Then contact the Seller for procedures. Do not return the merchandise until you have been instructed to do so.
4. If you return the merchandise, keep the shipper's receipt or packing slip. Your right to reimbursement of postal costs is determined by store policy.
5. If you have discussed your problem thoroughly with the Seller and remain dissatisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have the right to withhold payment under the Federal Trade Commission's Fair Credit Billing Act.

Macworld believes that the customer has a right to product and service satisfaction. If you continue to experience problems with mail-order purchasing, the President of Macworld Communications and the Editor-in-Chief of Macworld want to know about it. Please take a moment to write to: Jim Martin, President, Macworld Communications, or Letters to the Editor, Macworld, 501 Second Street, San Francisco, CA 94107. You may also phone the President at 415-243-0505 to discuss your situation. Our goal is to help you become a satisfied mail-order consumer.

MACWORLD
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Circle 292 on reader service card.

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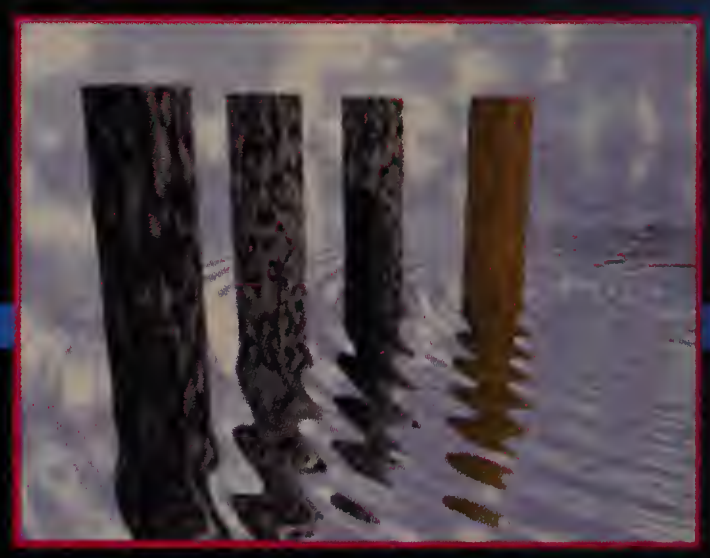

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Star background and planets courtesy of Advanced Digital Imaging. X-29 created by Evans and Sutherland and rendered by Creative Multimedia with Electric Image Animation System. Swivel 3D is a trademark of Paracomp, Inc. Super 3D is a tradmark of Silicon Beach Software.

UPDATES

Here's our list of the current shipping versions of Mac software we have received announcements for at press time. We hope you'll find it useful—because these days, keeping track of the latest CPU can be tough enough. The first price is the upgrade cost for registered owners; the second is the current list price.

Digital Darkroom version 2.0 does image, scanner, and printer calibration; performs real-time transformation to enable you to interactively scale, free rotate, stretch, distort, slant, and add perspective to selected areas; lets you accent gray-scale images with user-defined color overlays; and lets you paste, blend, feather, and dissolve selections into the documents. Silicon Beach Software, 619/695-6956. Contact vendor for update policy; $395 new.

Great Gantt version 1.3 includes a Dollar Progress feature that displays how much money has been spent on a project relative to plan; has a feature that enables you to preview a chart and to copy each chart page into the Clipboard. Memory management has also been improved. Varcon Systems, 619/563-6700. Contact vendor for update policy; $195 new.

StuffIt Classic version 1.6 runs with better data compression and is faster than the previous version. User can double-click on a folder to stuff or unstuff particular files. Virus-detection feature prevents users from uploading or downloading contaminated files. Sort ability enables archives to be instantly sorted by attributes such as name, date, or size. Compatible with StuffIt Deluxe and ShortCut. Aladdin Systems, 408/685-9175. Free; $25 new.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
1st Aid Kit ★	2.8	512KE/3.0		*
4th Dimension	2.1	1MB/6.0.2		Free
Aatrix CheckWriter II ★	2.01	512K/4.1		$10
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant Inc., Professional	1.0.4	1MB/6.0.3	9/90	$19.95
ACCPAC Bedford Simply Accounting	1.1	1MB/5.1		$50
AccuText	2.0	4MB/6.0.2		*
Address Book	2.0	1MB/6.0.2	6/90	$25
Adobe Illustrator	3.0	2MB/6.0.3	2/91	*
Adobe Type Manager ★	2.0	1MB/6.0.2		Free
AdWriter	2.0	1MB/6.0		Free
After Dark	2.0	512KE/4.1	7/90	*
AgfaType	2.0	2MB/6.0.2		Free
Alchemy	1.1	1MB/6.0	10/90	$25
Aldus FreeHand	2.02	1MB/6.0.3		*
Aldus PageMaker	4.0	1MB/4.1	9/90	$150
Aldus Persuasion	2.0	1MB/6.0		*
AmPack Plus ★	4.2.2	512K/3.2		$29.95
Analog Connection WorkBench	3.0	1MB/5.0	5/90	$50
AntiToxin	1.3	1MB/6.0.2		$15
Aperture	1.7	2MB/6.0.3	7/90	*
AppleShare File Server	2.0	512K/3.2		*
ArchiText	2.0	1MB/6.0.2		Free
Aristotle's Politics	2.0	2MB/6.0.3		Free
The Art Importer	2.0	1MB/6.0	5/90	$20
ArtRoom	3.0	512K/3.2		$199
AutoCalc	2.0	1MB/6.0		$95
AutoSave II	1.1	512KE/4.2	7/90	$7.50
A/UX	2.0	4MB/6.0.5		*
Aztec C	3.6	512KE/4.2		*
BackFax ★	1.5	1MB/6.0.3		Free
Back to Basics: Professional	2.0	512K/3.2		$75
Bridge	6.0	512K/3.2		$17
Business FileVision ★	1.5	1MB/6.0.2		*
Business Sense ★	1.2	1MB/6.0		*
Business Session ★	3.2	512K/3.2		Free
CA-Cricket Presents	2.0.1	1MB/6.0		*
Calculator	2.06	512K/3.2	4/90	$25
Construction Set ★				
CanDpener	1.1	512K/3.0		Free
Canvas	2.1	1MB/6.0		*
Capture	3.0	1MB/6.0		$15
Central System Manager	2.1	1MB/5.0x		*
Chameleon	3.0	512K/3.2		Free
Chemintosh II		1MB/6.0.2		Free
ChromaScan	2.0	6MB/6.0.5		*
Claris CAD	2.0	2MB/6.0		$79
Codecheck	2.0	1MB/6.0		Free
Colorset ★	1.5	1MB/6.0	6/90	Free
CompileIt	1.5	1MB/6.0.2		$30
CompuServe Navigator ★	2.1	512K/3.2		*
ConcertWare	5.1	512KE/4.2		$35
Control II	1.1	2MB/6.0.4		Free
CopyFlow	2.0	2MB/6.0	6/90	Free
Correct Grammar	2.0	1MB/4.2	9/90	$29.95
Cue	3.0	1MB/6.0.3		*
DacEasy Light Checkbook Accounting	2.0	1MB/6.0.3		*
Data Desk	3.0	512K/4.0.2	6/90	$125
DataMerge	2.0	512K/3.2		Free
dBase Mac ★	1.01	1MB/4.1		Free
Deluxe Music Construction Set	2.5	512K/6.0.2		*
DeskPaint ★	3.0	1MB/4.2	5/90	Free
Developer Stack	3.0	1MB/6.0		$15
DiagramMaker ★	1.1	1MB/6.0.2		*
Digital Darkroom ★	2	1MB/6.0.2		*
DiskDoubler	2.0	1MB/6.0.2		*
DiskExpress II	2.04	1MB/6.0	11/90	*
DiskFit and Network DiskFit	2.0	1MB/6.0		*
DiskTop	4.0	1MB/6.0		*
Display AdBuilder	1.1	1MB/6.0.3		*
DocuComp	1.5	512K/3.0	12/90	$19.95
Dollars and Sense	4.1	512KE/3.2		*
Double Helix	3.5	1MB/6.0		*
Dreams	1.1	1MB/6.0.2		*
DynaPerspective	2.0	2MB/6.0.4		Free
DynoDex ★	1.21	1MB/6.0	6/90	Free
Easy Color Paint	2.0	1MB/6.0.2	9/90	*
Empower II ★	3.03	1MB/4.2		Free
EndLink	1.1	512K/3.2		Free
EndNote Plus		512KE/3.2		$49
Exodus	2.0	1MB/6.0		$50
Extender GrafPak	3.0	1MB/6.0.2		$30
Falcon	2.2	1MB/3.2		$3
Fastback II	2.1	512KE/4.1		$30
Fast Forms	2.0	1MB/6.0	11/90	$25
FastLabel	2.0	1MB/6.0		$36
FastTrack	1.5	512KE/5.5		$20
FaxGate ★	1.02	1MB/6.0		Free
Ferrari Grand Prix ★	1.6	512K/3.2		$10
FetchIt	2.0	512K/6.0.1		*
FileMaker Pro	1.0	1MB/4.2	2/91	*
Filevision IV	1.1	1MB/4.2		$15
FilmMaker	2.0	5MB/6.0.3	3/91	*
Finale	2.01	1MB/6.0.2	5/90	$5
Financial Analysis	3.0	512K/3.0		*
Findswell	2.01	512KE/3.2		*
Fontographer	3.1	1MB/4.2	5/90	*
FontShare	2.0	1MB/6.0		Free
FormsProgrammer ★	2.03	1MB/6.0.2		$15
FoxBase+/Mac ★	2.10	1MB/6.0		$75
Freedom of Press ★	2.2	1MB/6.0		Free
FreeFlow	3.0	1MB/6.0.3		Free
Full Impact ★	2.0	1MB/6.0		$50
FullWrite Professional	1.5	2MB/6.0.2		*
Gamblin' Times	3.0	1MB/6.0	3/91	$10
GeoQuery	2.0	1MB/6.0	10/90	*

(continues)

Bold *= first time the product is being listed.*

★ *= minor update.*

Req. *= min. RAM and system software required*

Rev. *= last time(in past year) reviewed this or an earlier version.*

Price *= cost for update to registered owners.*

* *= contact your dealer for update policy.*

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
Gofer	2.0	1MB/4.1		$25
GQL	2.0	1MB/5.0		*
Grammatik Mac	2.0	1MB/5.0	9/90	Free
Great Gantt	1.3	1MB/6.0	12/90	Free
Great Plains Accounting Series	5.2	1MB/6.0		*
HandDff II	1.1	1MB/6.0.2	4/90	Free
Handwriting Analyst ★	3.1	512K/3.2		$24.95
Hard Disk Util	3.0	1MB/6.0		$65
Help DA	3.0	1MB/6.0		Free
HFS Backup	3.0	512K/3.2		$35
HydroMac	2.0	1MB/6.0		*
HyperAnimator ★	1.5	1MB/6.0.3		$29.95
HyperCard	2.0	1MB/6.0.3		$49
HyperDA ★	1.2	512K/3.2		$10
HyperEngine Developer's Tool ★	1.1	1MB/6.0.3		Free
HyperLibrary	2.0	1MB/5.0		*
HyperTools	2.0	2MB/6.0.2		$20
HyperWindows ★	1.2	1MB/6.0.2		$20
Icon-It	2.0	1MB/6.0.2	9/90	$29
if:x Forms Designer	1.1	1MB/6.0	9/90	Free
Igor ★	1.1	1MB/6.0	5/90	Free
Image Grabber	2.0	1MB/6.0.2		Free
ImageStudio	1.5	1MB/6.0		$99
ImageWriter LQ Print Driver★	2.0	512K/3.2		Free
In-CAD	2.0	2MB/6.0		*
InfoLogic Envelope ★	1.1c	512KE/4.0		$5
Insight Expert Accounts Payable	2.2	1MB/6.0		*
Insight Expert Accounts Receivable	2.2	1MB/6.0.2		*
Insight Expert General Ledger	2.2	1MB/4.2		$99
Inspiration	2.0.5	1MB/4.2	11/90	Free
Instant-Expert Plus	3.0	1MB/5.0		Free
JetLink Express ★	1.01	1MB/6.0		Free
KidsTime ★	1.2	512K/3.2		$15
KiwiEnvelopes	3.0	512KE/4.1		$10
Language Systems Fortran★	2.1	2MB/6.0.4		Free
LapLink Mac III	3.0	512K/2.0	7/90	*
LaserPaint Color II ★	1.02	1MB/6.0.3		Free
LetraStudio	1.5	2MB/6.0		$45
LetrTuck+	2.0	512K/3.2		$20
Lightspeed Color Layout System	2.0	1MB/6.0		*
Lookup	2.0	1MB/6.0	5/90	$15
Mac86	2.0	1MB/6.0.2		$10
Mac286	2.0	1MB/6.0.2		$10
Mac3270	2.0	1MB/6.0.3		*
MacAnalyst	2.0	2MB/6.0		$125
MacArchitrion	4.0	2MB/6.0.3		Free
MacAtlas Paint	2.0	512K/3.2		$35
MacClassAds	4.0	1MB/6.0		*
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MacDraw II	1.1	1MB/6.0		*
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Macintosh Yellow Pages	**1.1**	**1MB**/6.0		*
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MacFlow ★	3.1.5	1MB/6.0.3		Free
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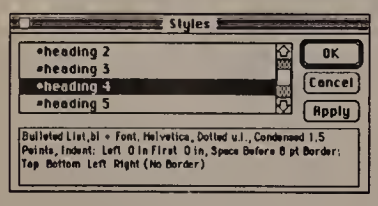

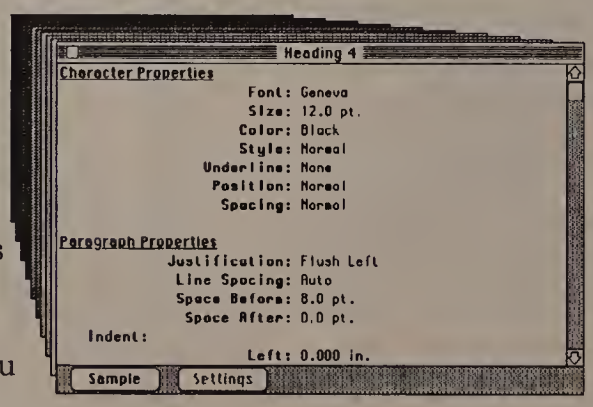

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MacMainFrame 3270/CUT	2.1	2.5MB/6.0.2		$100
MacMoney	3.5	512KE/4.0		$12
MacPhonebook	3.0	1MB/6.0		*
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MacRecorder	2.0	512K/3.2		*
MacroMind Director	2.0	2MB/6.0.2	10/90	$100
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MacScan	1.6	1MB/6.0		$35
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MacTell	3.5	512K/3.0		*
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MacVision Video Digitizer	3.1	1MB/6.0.2		$50
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Master Tracks Pro 4	4.12	1MB/4.1	6/90	$45
MathCAD ★	2.06	1MB/6.0.2		Free
MathType	2.1	512K/6.0.2		*
Metleb	1.2	1MB/3.0		*
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McClint	2.0	1MB/4.2		$25
McCPrint	2.0	512K/4.2		$25
McMax	2.0	1MB/5.0		*
Memorybank Manager	3.0	1MB/6.0		Free
MGMStation ★	2.5	512KE/3.0		*
MiBAC Jazz	1.2.2	1MB/6.0	11/90	Free
Improvisation				
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Microsoft File	2.0	512K/3.2		*
Microsoft Mail	2.0	1MB/6.0.2		*
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Microsoft Works	2.0	512K/6.0		*
MindWrite ★	2.1	512KE/4.2		*

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NuTools	1.2	1MB/6.0		*
Nutrition Stack	2.0	1MB/6.0.2		$20
OmniPage ★	2.1	1MB/6.0.2		Free
Omnis 3 Plus/Express	2.0	512KE/3.2		*
On Schedule	2.0	1MB/3.0		*
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PacerLink	5.0	512K/5.0		*
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Performer Sequencer	3.5	1MB/6.0		Free
Personal Golf Stats	2.0	512K/3.2		Free
Personal Phone ★	1.1	1MB/6.0		*
Personal Reference Catalog	2.0	1MB/6.0	10/90	$10
Phonenet Liaison	3.0	1MB/4.2		$75
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PixelPaint	2.0	2MB/4.1		$99
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Eagle Syquest Drive	**$499**
FWB HammerDisk44	***Call!***
PLI Infinity 40	**$695**
Syquest Cartridge (*In Stock!!!*)	**$72**

SCANNERS

Caere TYPIST	**$465**
Microtek 300ZS	***CALL!***
Free Color Studio & Image Studio	
UMax UG80 (256 Grey Scale)	**$995**
UMax UC300 (24 bit color w/PhotoShop)	***Call!***
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call for other E-Machines	
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Seiko 14" w/RasterOps 264	**$980**
RasterOps 208	**$295**
RasterOps 264	**$395**
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SuperMac	***Call!***

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DayStar Fast Cache IIci	**$275**
DayStar 40 MHz PowerCache IIci	**$895**
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DayStar 33, 40 & 50 MHz PowerCard	***Call!***
Dove MaraThon 030 for Mac Classic	***Call!***
Total Systems SE 16 MHz 030	**$395**
Total Systems SE 20 MHz 030	**$755**
Total Systems SE 25 MHz 030	**$995**
Total Systems SE Gemini 33 MHz 030	**$1185**

DATA MODEMS

Challenger VP2400	**$69**
Challenger VP2400 V.42 bis	**$195**
MacUser #1 2400 BPS Modem (4.5 Mice)	
Hayes V-Series Ultra 9600 *V.32, V.42, V.42 bis*	**$795**
Practical Peripherals 9600SA *V.32, V.42, V.42 bis*	**$499**
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105 Int/Ext	**$499/$599**
210 Int/Ext	**$875/$959**
MacWren	
300 (350M) Int/Ext	**$1245/$1495**
330 (Runner) Int/Ex	**$1495/$1695**
600 (702M) Int/Ext	**$1785/$1875**
630 (766M) Int/Ext	**$2049/$2129**
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PLI (Sony)	**$795**
Toshiba	**$745**
Pioneer DRM-600 Minichanger	***Call!***

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Challenger VP24/96SR	***Call!***
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Abaton 24/96 InterFax	**$295**
Send & Receive 2400 data/9600 Fax	
Global Village TelePort	**$175**
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Orchid Fax Modem	**$425**
Send & Receive Networkable 2400data/9600 fax includes BackFax	
Prometheus 9600 Plus	**$695**
Send & Receive GS 9600 data/9600 fax	

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601 **911 Utilities** Microcom; 919/490-1277; fax 919/490-6672.

A

602 **AEC Information Manager** AEC Management Systems; 703/450-1980, 800/346-9413; fax 703/450-9786.

603 **After Dark** Berkeley Systems; 415/540-5536, 800/877-5535; fax 415/540-5115.

604 **AgentDA** Team Building Technologies; 514/278-3010.

605 **Andrew Tobias' Managing Your Money** MECA Software; 203/226-2400; fax 203/226-2437.

* **AutoMac III** Microsoft Corp.; 206/882-8080, 800/426-9400.

B

606 **Balloon Stack** BugByte; 302/994-1502, 800/284-9220.

C

610 **CalenDAr** Psybron Systems; 304/340-4260, 800/866-4260.

611 **CD7** QL Tech; 305/446-2477; fax 305/447-0745.

612 **CheckFree** Checkfree Corp.; 614/898-6000, 800/882-5280.

613 **CheckWriter II** Aatrix Software; 701/746-6801, 800/426-0854.

614 **Cheshire** Abbott Systems; 914/747-4171, 800/552-9157; fax 914/747-9115.

615 **ClickArt EPS Animals & Nature** T/Maker Co.; 415/962-0195; fax 415/962-0201.

616 **ClickArt EPS Sports & Games** T/Maker Co.; 415/962-0195; fax 415/962-0201.

617 **ClickArt EPS Symbols & Industry Volume 1** T/Maker Co.; 415/962-0195; fax 415/962-0201.

618 **Color Convert** BugByte; 302/994-1502, 800/284-9220.

D

620 **DesignCAD 2D/3D Macintosh** DesignCAD; 918/825-4848; fax 918/825-6359.

Disinfectant John Norstad; freeware.

621 **DiskExpress II** ALSoft; 713/353-4090; fax 713/353-9868.

623 **DiskFit** SuperMac Technology; 408/245-2202; fax 408/735-7250.

624 **DiskTop** CE Software; 515/224-1995; fax 515/224-4534.

625 **Dollars and Sense** Software Toolworks; 415/883-3000.

F

628 **FastTrack Schedule** AEC Management Systems; 703/450-1980, 800/346-9413; fax 703/450-9786.

* **FileMaker Pro** Claris Corp.; 408/727-8227.

629 **FilmMaker** Paracomp; 415/956-4091.

630 **Financial Decisions** GenMicronics; 813/345-5020.

631 **For the Record** Nolo Press; 415/549-1976, 800/992-6656; fax 415/548-5902.

632 **Fractal Clip Art** Koyn Software; 314/878-9125.

G

633 **Gamblin' Times** Bruce Wilson Advertising; 818/791-3656.

634 **GEM-CD** Wayzata Technology; 612/447-7321, 800/735-7321.

635 **Gofer** Microlytics; 716/248-9150, 800/828-6293.

636 **Great Gantt** Varcon Systems; 619/563-6700; fax 619/563-1986.

H

637 **HandOff II** HandOff Corp.; 214/727-2329.

638 **The Heizer Catalog** Heizer Software; 415/943-7667, 800/888-7667.

640 **HyperTax Tutor** SoftStream International; 609/866-1187, 800/262-6610.

I

641 **IFS Explorer** Koyn Software; 314/878-9125.

642 **if:X Business Expense Reports** SoftView; 805/385-5000, 800/622-6829; fax 805/385-5001.

643 **if:X Personal Tax Analyst** SoftView; 805/385-5000, fax 800/622-6829; fax 805/385-5001.

644 **INIT Manager** Baseline Publishing; 901/682-9676, 800/926-9676; fax 901/682-9691.

645 **INITPicker** Microseeds Publishing; 813/882-8635.

646 **The Investor** P3 Software; 609/662-3420.

K

647 **KeyPlan** Symmetry Software Corp.; 602/998-9106, 800/624-2485.

L

648 **Larry Rosen Programs** Larry Rosen Co.; 502/228-4343.

649 **LaserMax 1000** LaserMax Corp.; 612/944-9696; fax 612/944-8509.

650 **The Little Mac Book** Peachpit Press; 415/527-8555, 800/283-9444; fax 415/524-9775.

M

651 **MacBack 8000** Advanced Digital Information Corp.; 206/881-8004, 800/336-1233; fax 206/881-2296.

652 **MacInTax** SoftView; 805/385-5000, 800/622-6829; fax 805/385-5001.

653 **The Mac is Not a Typewriter** Peachpit Press; 415/527-8555, 800/283-9444; fax 415/524-9775.

654 **MacMoney** Survivor Software; 213/410-9527; fax 213/338-1406

* **MacProject II** Claris Corp.; 408/727-8227.

655 **MacroMaker** Apple Computer; 408/996-1010.

656 **MacSchedule** Mainstay; 818/991-6540; fax 818/991-4587.

657 **MacSchedule Plus** Mainstay; 818/991-6540 fax 818/991-4587.

658 **MacTools Deluxe** Central Point Software; 503/690-8090, 800/888-8199; 503/690-8083.

659 **Market Manager Plus** Dow Jones; 609/520-4000.

660 **MasterJuggler** ALSoft; 713/353-4090; 713/353-9868.

661 **MasterStrokes** Datadesk International; 818/998-4200, 800/826-5398.

662 **Micro Planner** Micro Planning International; 415/389-1420, 800/852-7526; fax 415/389-8046.

663 **Micro Planner X-Pert** Micro Planning International; 415/389-1420, 800/852-7526; fax 415/389-8046.

MIDRANGE HARD DRIVES

665 Advanced Gravis Computer Technology; 604/434-7274, 800/663-8558.

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666 Alliance Peripheral Systems; 816/478-8300, 800/233-7550; fax 816/478-4596.
667 Apple Computer; 408/996-1010.
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669 CMS Enhancements; 714/222-6000.
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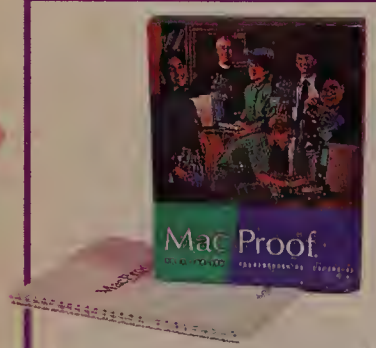

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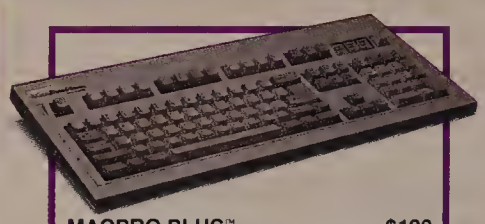

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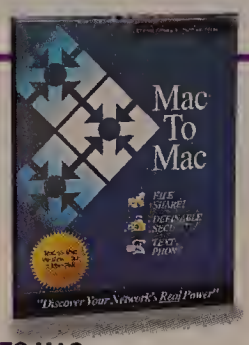

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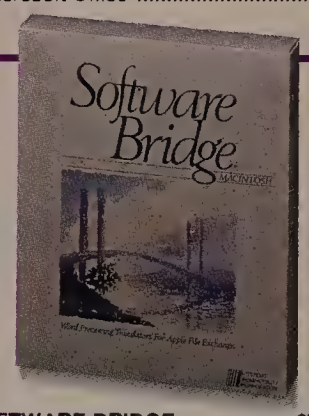

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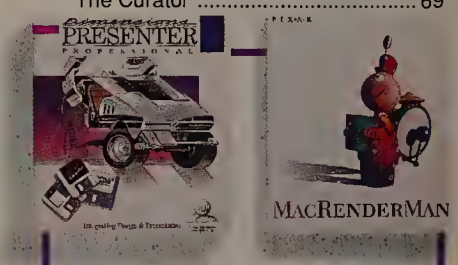

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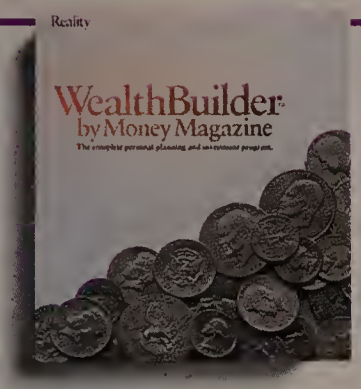

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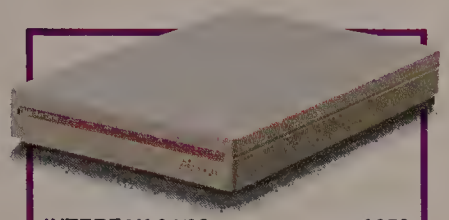

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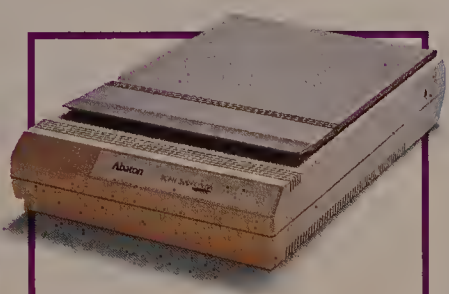

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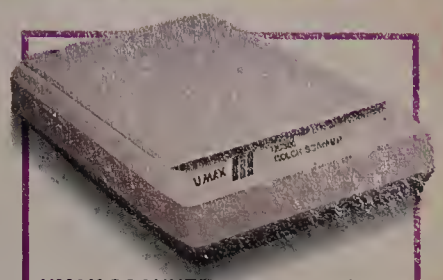

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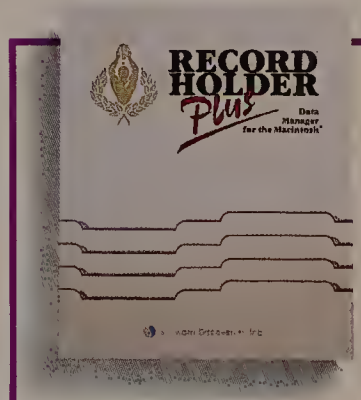

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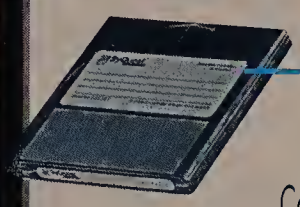

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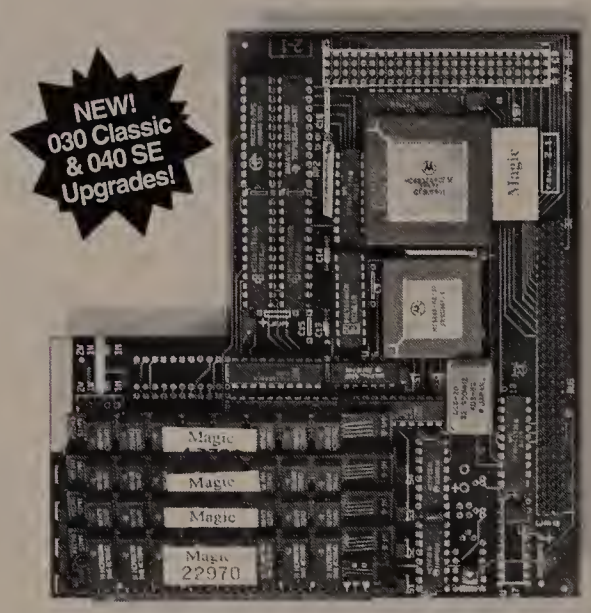

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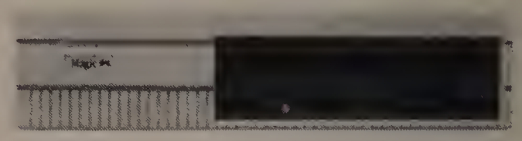

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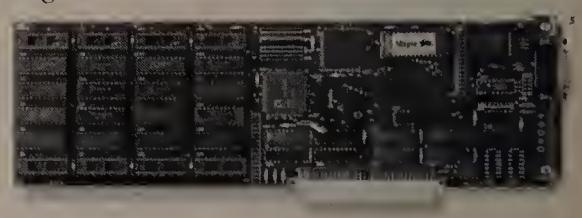

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Novell EtherPort II	464
Novell EtherPort SE,SE/30	455
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Insignia Access PC	78
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Orchid Technololgies Fax Modem	439
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Practical Peripherals 9600 V.32/V.42	519
Promethius ProModem 2400 Internal	198
Shiva Netmodem 2400	429
Shiva Netmodem V.32	1429
Telebit T1000 9600 Baud	625
Telebit Trailblazer Plus 19200 BPS	899

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US Robotics Courier HST 14.4 V.42BIS	679
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Radius Two Page Display 19	1069
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RasterOps 24L	2839
RasterOps 24L 16	4965
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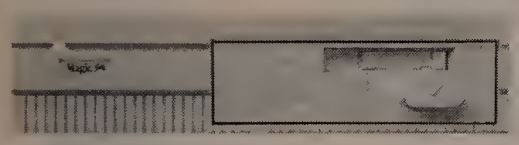

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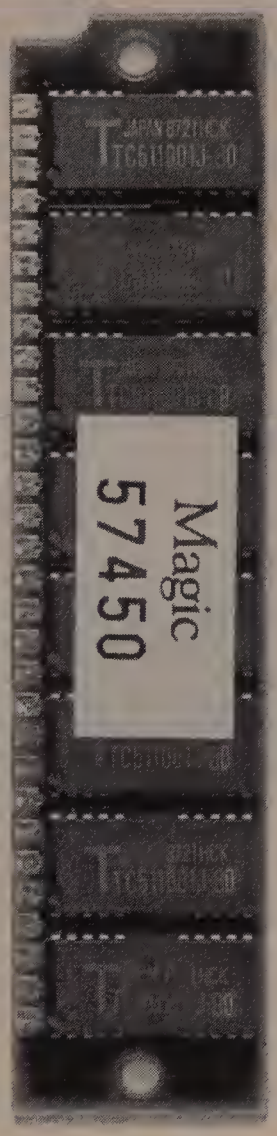

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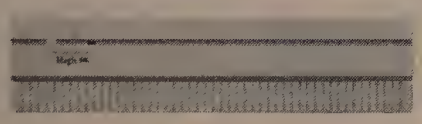

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RasterOps ClearView Mac II	1089
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RasterOps Accelerator	425
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RasterOps SFX	1065
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Sigma ColorMax 8/24 19	4299
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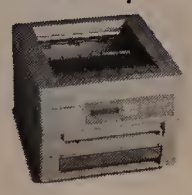

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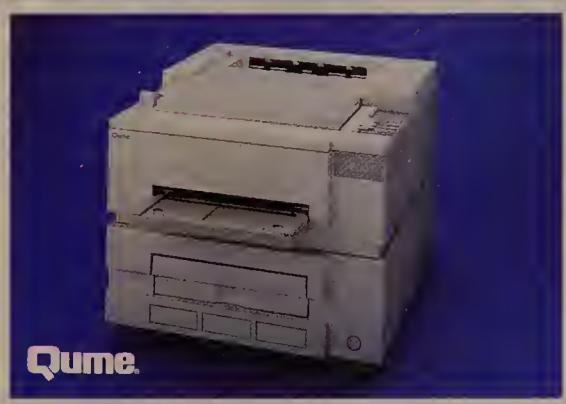

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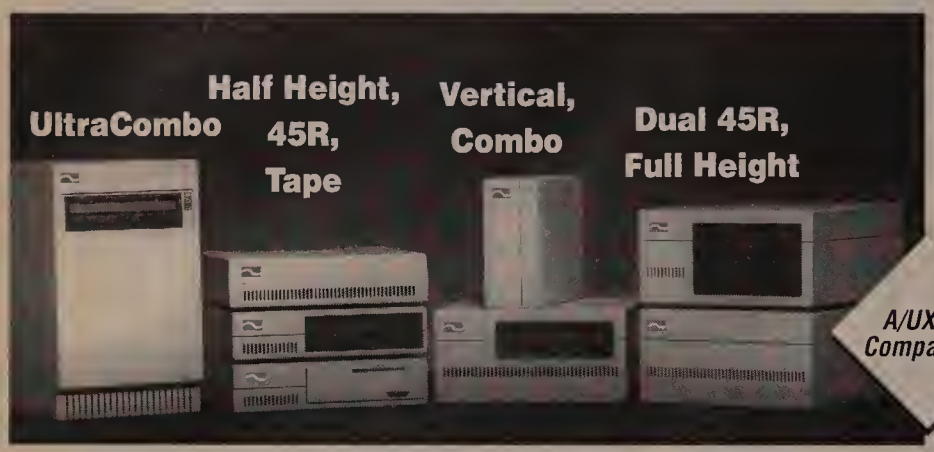

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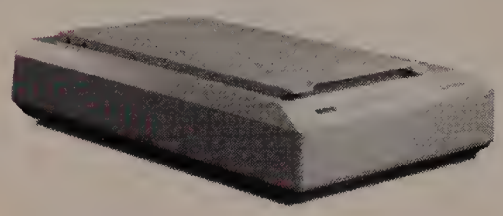

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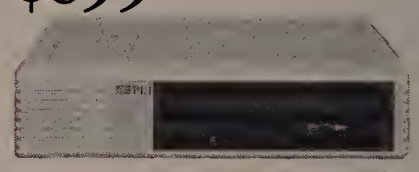

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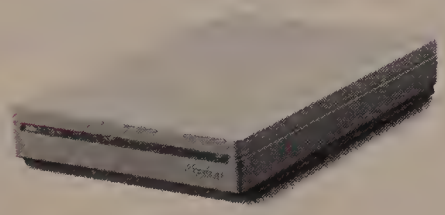

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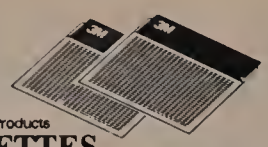

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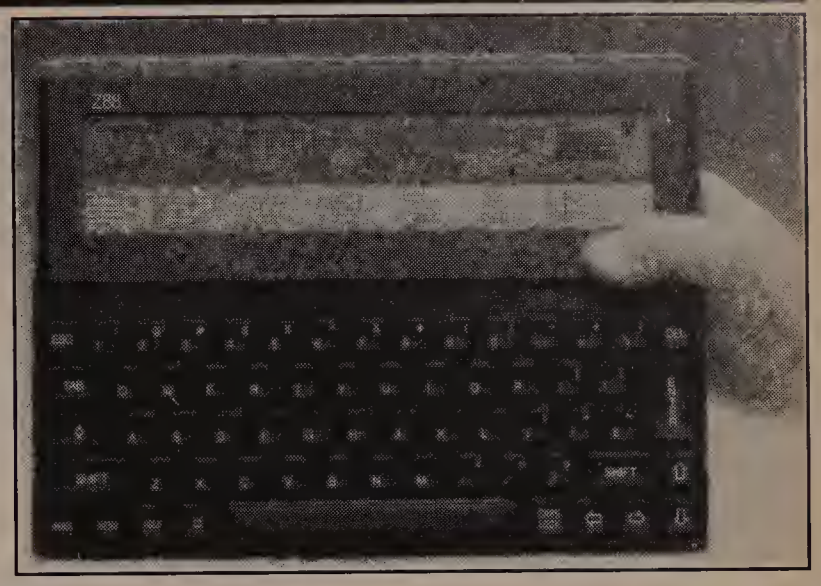

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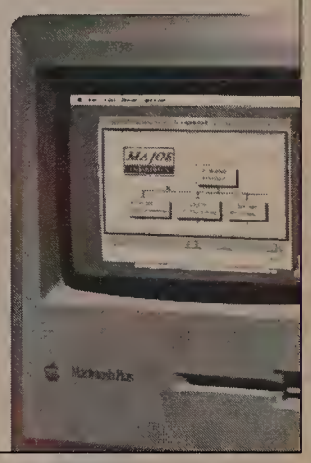

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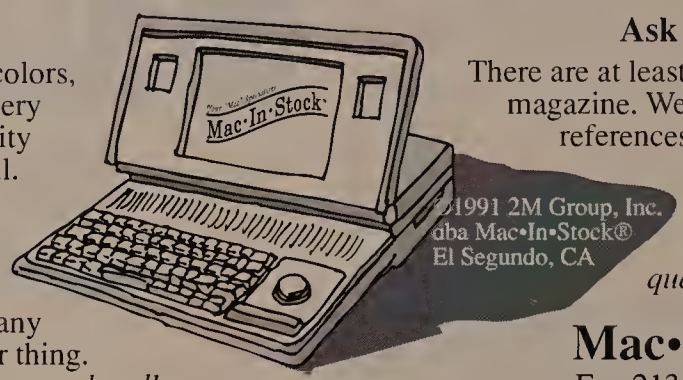

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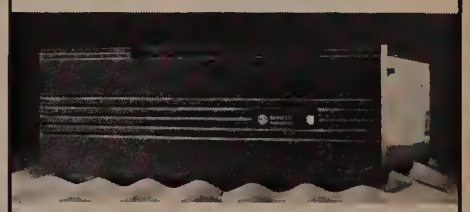

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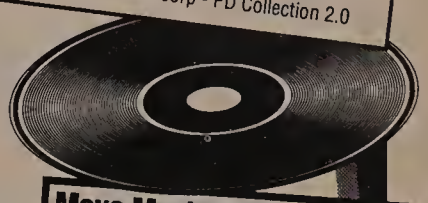

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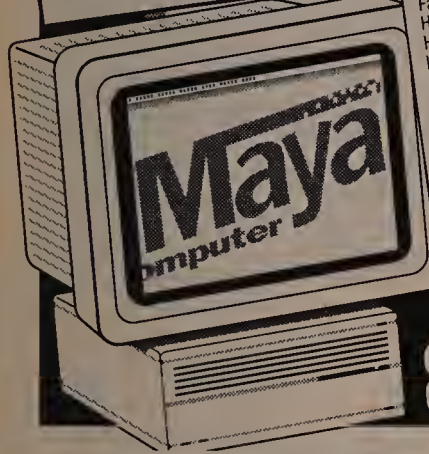

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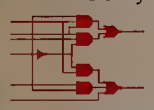

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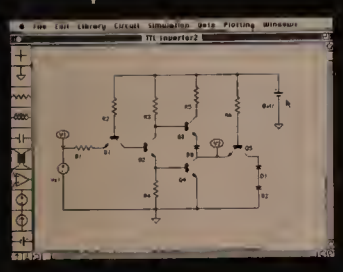

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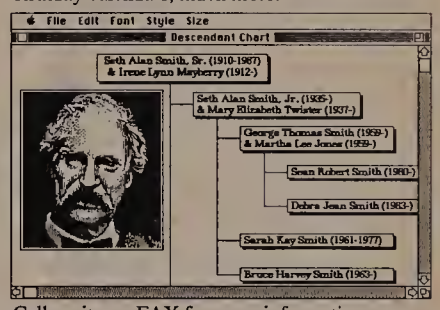

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11-36 Mac IIsi,13"HR Clr &Kb	29.95	11-22 Super Mac 19" Clr Mntr	29.95
11-37 Mac IIsi, 12" Mtr & Kb	29.95	11-04 Apple Scanner	15.95
10-73 Mac II, Clr Mtr & Ext Kb	29.95	10-37 Imagewriter II	15.95
11-02 Mac II,IIx,IIfx CPU	19.95	10-90 LaserWriter II	24.95
11-01 Mac IIci Computer Only	15.95	11-25 Personal LaserWriter	24.95
10-98 Mac IIci, Clr Mtr & E.Kb	29.95	11-40 T.I. microLaser PS	19.95
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BEST-SELLERS

BUSINESS SOFTWARE

Months on chart	Last month	This month		
70	1	1	**Microsoft Word**	Microsoft Corporation
49	3	2	**Microsoft Works**	Microsoft Corporation
61	2	3	**Microsoft Excel**	Microsoft Corporation
57	4	4	**Aldus PageMaker**	Aldus Corporation
22	5	5	**FileMaker II**	Claris Corporation
9	7	6	**Quicken**	Intuit
23	8	7	**QuarkXPress**	Quark
46	6	8	**MacWrite II**	Claris Corporation
17	—	9	**Adobe Illustrator**	Adobe Systems
3	—	10	**PrintShop**	Brøderbund Software

EDUCATION SOFTWARE

Months on chart	Last month	This month		
24	2	1	**Where in the World Is Carmen Sandiego?**	Brøderbund Software
37	3	2	**Reader Rabbit**	The Learning Company
5	1	3	**Where in Time Is Carmen Sandiego?**	Brøderbund Software
11	4	4	**Where in the USA Is Carmen Sandiego?**	Brøderbund Software
50	—	5	**Math Blaster**	Davidson & Associates

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month		
13	2	1	**Tetris**	Spectrum HoloByte
15	1	2	**SimCity**	Maxis Software
7	3	3	**Welltris**	Spectrum HoloByte
18	—	4	**Beyond Dark Castle**	Silicon Beach Software
46	—	5	**MacGolf**	XOR/PCAI

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month		
49	1	1	**TOPS**	Sitka Corporation
44	2	2	**AppleShare**	Apple Computer
6	3	3	**Timbuktu**	Farallon Computing
3	4	4	**White Knight**	FreeSoft
13	—	5	**Netware for Macintosh**	Novell

MASS STORAGE*

Months on chart	Last month	This month		
13	1	1	**MacStack SD40**	CMS Enhancements
28	2	2	**MacStack SD20**	CMS Enhancements
10	—	3	**Apple Hard Disk 40SC**	Apple Computer
3	—	4	**MacStack SD80**	CMS Enhancements
15	3	5	**MacStack SD30**	CMS Enhancements

ADD-IN BOARDS/MEMORY

Months on chart	Last month	This month		
5	1	1	**Pivot**	Radius
4	5	2	**Macintosh Display Card 8•24**	Apple Computer
7	—	3	**ColorBoard 264**	RasterOps Corporation
29	2	4	**Apple 1MB Memory Expansion Kit**	Apple Computer
6	3	5	**Radius TPD Interface**	Radius

UTILITY SOFTWARE

Months on chart	Last month	This month		
11	1	1	**SAM II**	Symantec Corporation
11	2	2	**SUM II**	Symantec Corporation
5	3	3	**Norton Utilities for the Macintosh**	Symantec Corporation
3	—	4	**Pyro**	Fifth Generation Systems
3	—	5	**Macintosh Tools Deluxe**	Central Point Software

PRODUCT WATCH

Recent or forthcoming products of particular interest.

Microsoft Mail 3.0 *Microsoft Corporation*
An update of the popular electronic mail system

The Clipper *Jasmine Technologies*
A 2½-inch miniature drive

Aldus FreeHand 3.0 *Aldus Corporation*
A new version of the illustration program providing greater accuracy and new features such as flicker-free drawing

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during November1990.

*Does not include hard drives installed at the factory.

FOR THE FIRST TIME, THE PRODUCT JUDGED BEST IN JAPAN WASN'T MADE IN JAPAN.

For 33 consecutive years, the Japanese government has awarded the "G-Mark" Grand Prize to the best product sold in Japan. It's a formal recognition of extraordinary product design, function and quality.

And, for 33 consecutive years, products from innovative companies like Sony, Nissan, Honda and Canon have won.

Now, for the first time, Japan has bestowed this honor upon a foreign product: The 1990 G-Mark Grand Prize has been awarded to the NeXT™ Computer System.

"Congratulations to NeXT Computer on being the first American company to win this prestigious award," said U.S. Secretary of Commerce, Robert Mosbacher. "In this achievement, NeXT has raised the bar for other U.S. manufacturers."

We sincerely thank Japan's Ministry of International Trade and Industry for selecting the NeXT computer from more than 1200 products from 391 companies. It's just the sort of encouragement every young company can use.

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Circle 299 on reader service card

Keyboard Shelf and SideClip with Macintosh SE/30.

Keyboard Slideaway with Macintosh IIci.

SPACE THAT WORKS

You're tripping over your keyboard. Your CPU needs its own desk. Your monitor is too low. That report you're working on has vanished. Paper is everywhere.

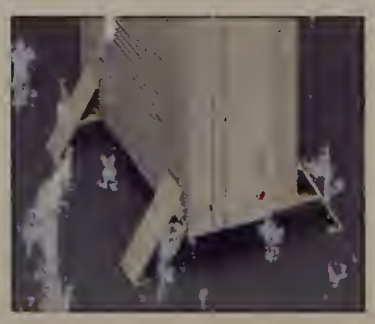
But don't give up.

What you need is some help from Kensington.

Increase valuable desk space with our new Keyboard Shelf for the compact Mac, or with Keyboard Slideaway® for the Mac II.

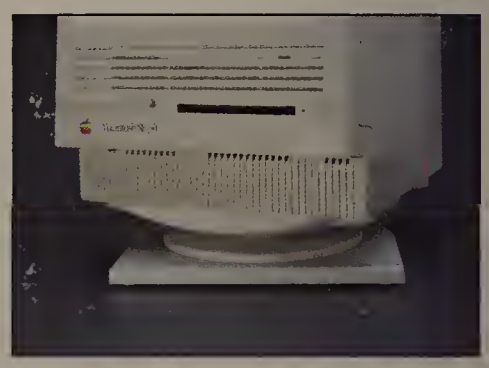
Both do more than just get your keyboard out of the way.

Keyboard Shelf's recessed storage compartment is ideal for holding pens, disks and other desk items. And Keyboard Slideaway extends a narrow desktop into a wider workspace.



Another way to increase your workspace is our sturdy Mac II stand. The perfect addition for anyone who wants to get their CPU off their desk and onto the floor.

For the compact Mac, there's Maccessories® Tilt/Swivel. With it, you can rotate your Mac up to 100° and tilt up to 16° for just the right viewing position. And unlike other tilt/swivels, we've combined heavy duty plastic and high density polyethylene for an ultrasmooth movement.



What's more, Kensington's products fit right in with the design of your Mac. The styling is complementary. The colors identical. Even the same materials are used.

Kensington.

Because you can't work efficiently if your space doesn't work.

For a free brochure and the dealer nearest you, call 800-535-4242. Outside the U.S., call 212-475-5200.

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